ELECTRICAL TIMES

THURSDAY
17 JAN.
1952
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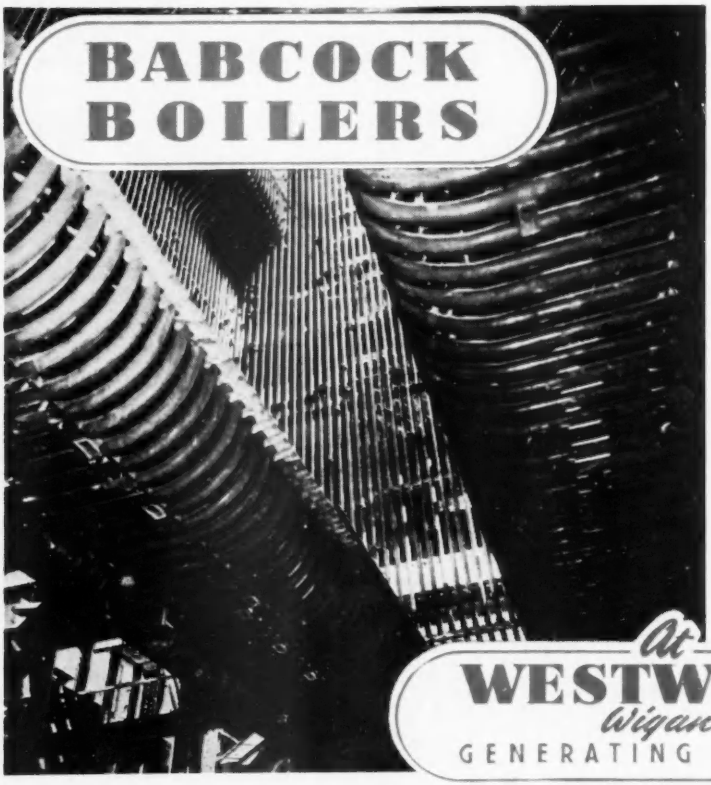


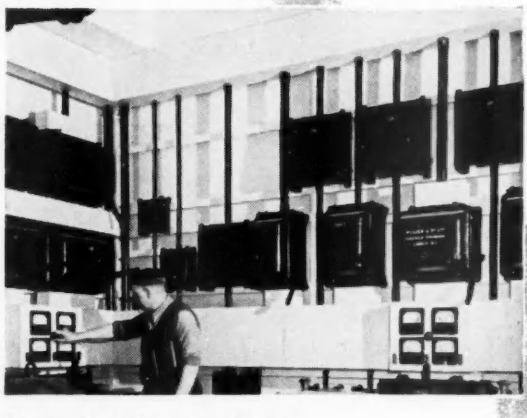
At
WESTWOOD
Wigan
GENERATING STATION

Westwood generating station, which is being equipped with BABCOCK boilers, is one of the many important stations of the British Electricity Authority for which BABCOCK & WILCOX, LTD. are supplying not only the boilers but also the coal pulverising plant, pipework and cranes, and the coal, ash and dust handling equipment; an indication of the ***comprehensive service*** offered by the BABCOCK organisation.

The boiler installation comprises five BABCOCK High Head boilers, pulverised fuel fired, with a total capacity of 1,500,000 lb./hr. M.C.R at 625 lb./sq. in. at 860°F.

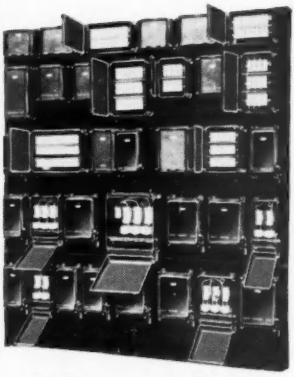
BABCOCK & WILCOX LTD., BABCOCK HOUSE, FARRINGDON ST., LONDON, E.C.4

Unity is sense



Simplex Switchgear installed by Messrs Pulver & Co Ltd London WI

Here's an installation at the Wardour Street premises of Associated British Pathé—housing the most modern film-processing laboratory and the only fully equipped film studio in Central London



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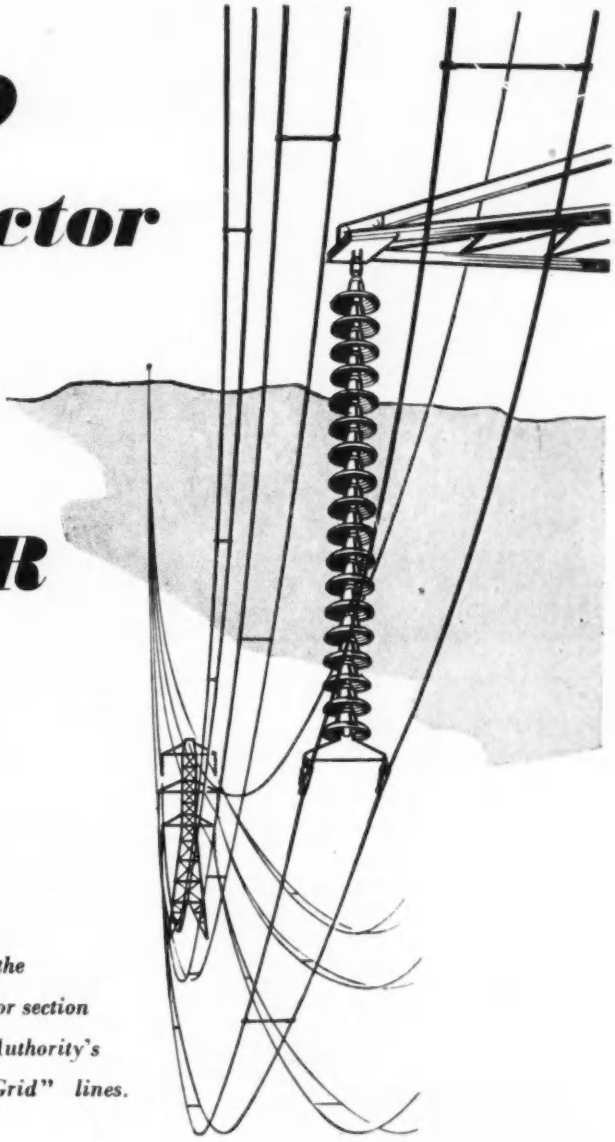
AWCO conductor for the SUPER grid



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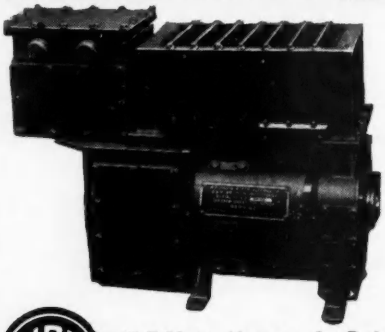

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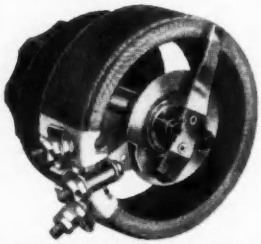

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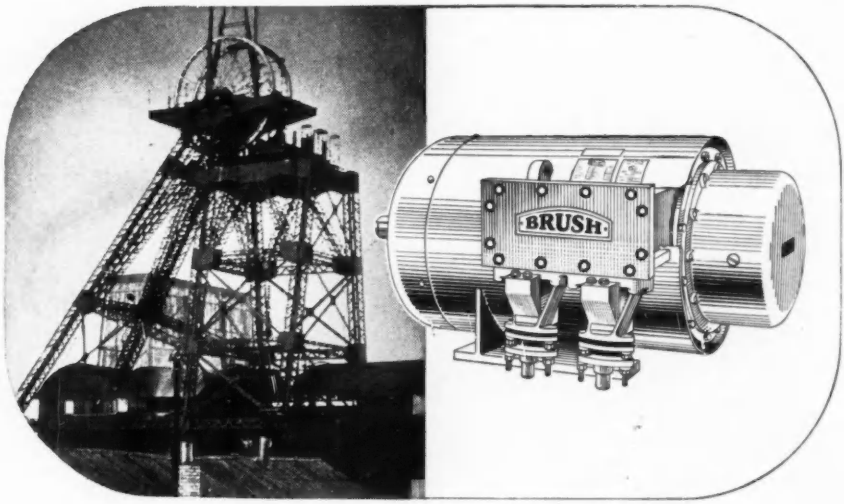

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RS25
RS20

It all adds up to ADAPTABILITY

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RS60—60 *amps, 230 volts, A.C. and D.C., up to 4 poles.*

RC —*A "spring return to neutral" 3-position switch for use as a controller for Circuit Breakers or Governor Motors.*

FERGUSON PAILIN 'RS' switches have been designed to facilitate remote or local control of many types of equipment.

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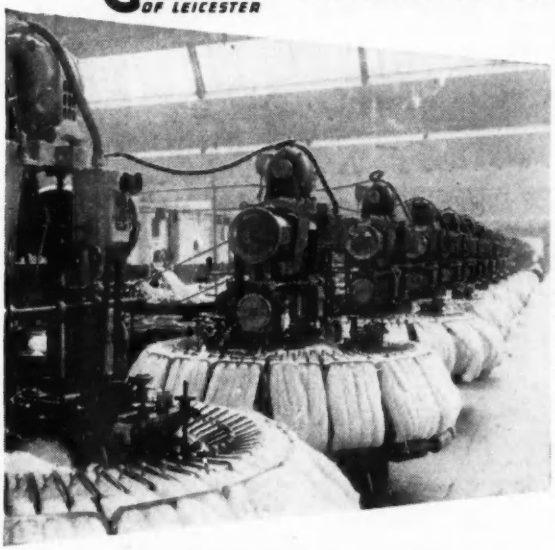

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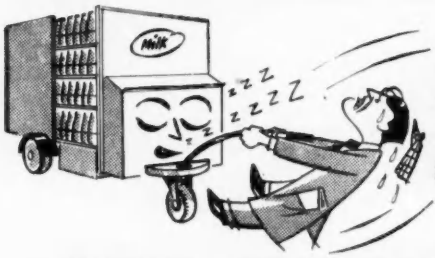

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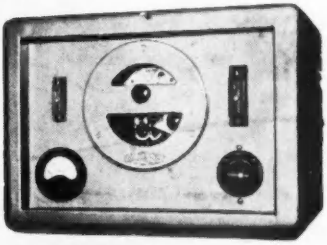

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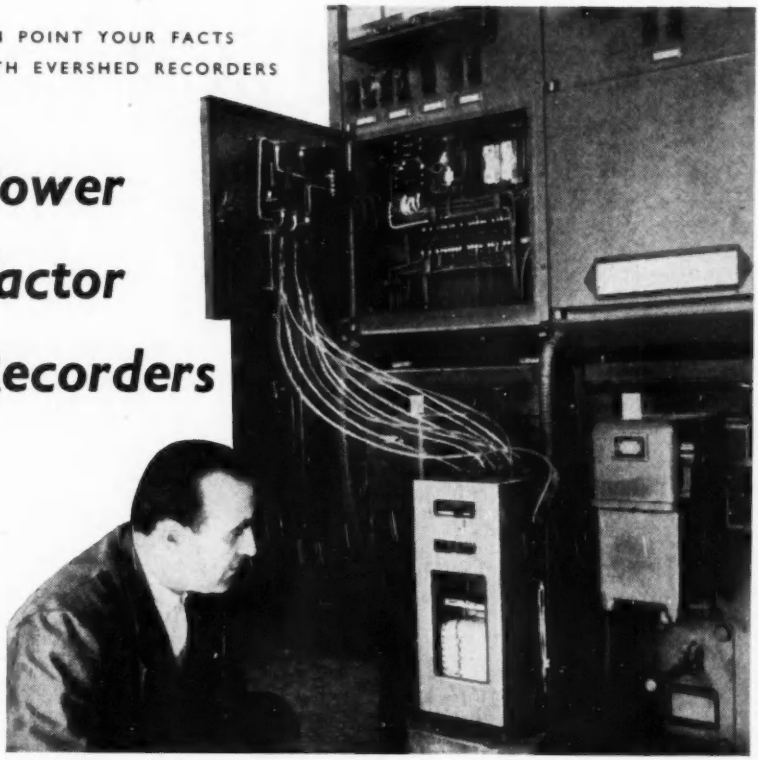

In order to lower the cost per kilowatt of station capacity, power companies throughout the world, such as the Athens Piraeus Electric Co. Ltd., have installed Evershed recorders as illustrated. These instruments keep a permanent, 24 hour a day check on the power factor and enable the company to ascertain if any overloading is due to low power factor.

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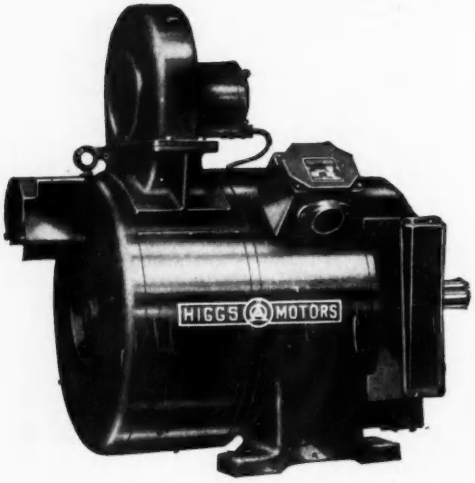

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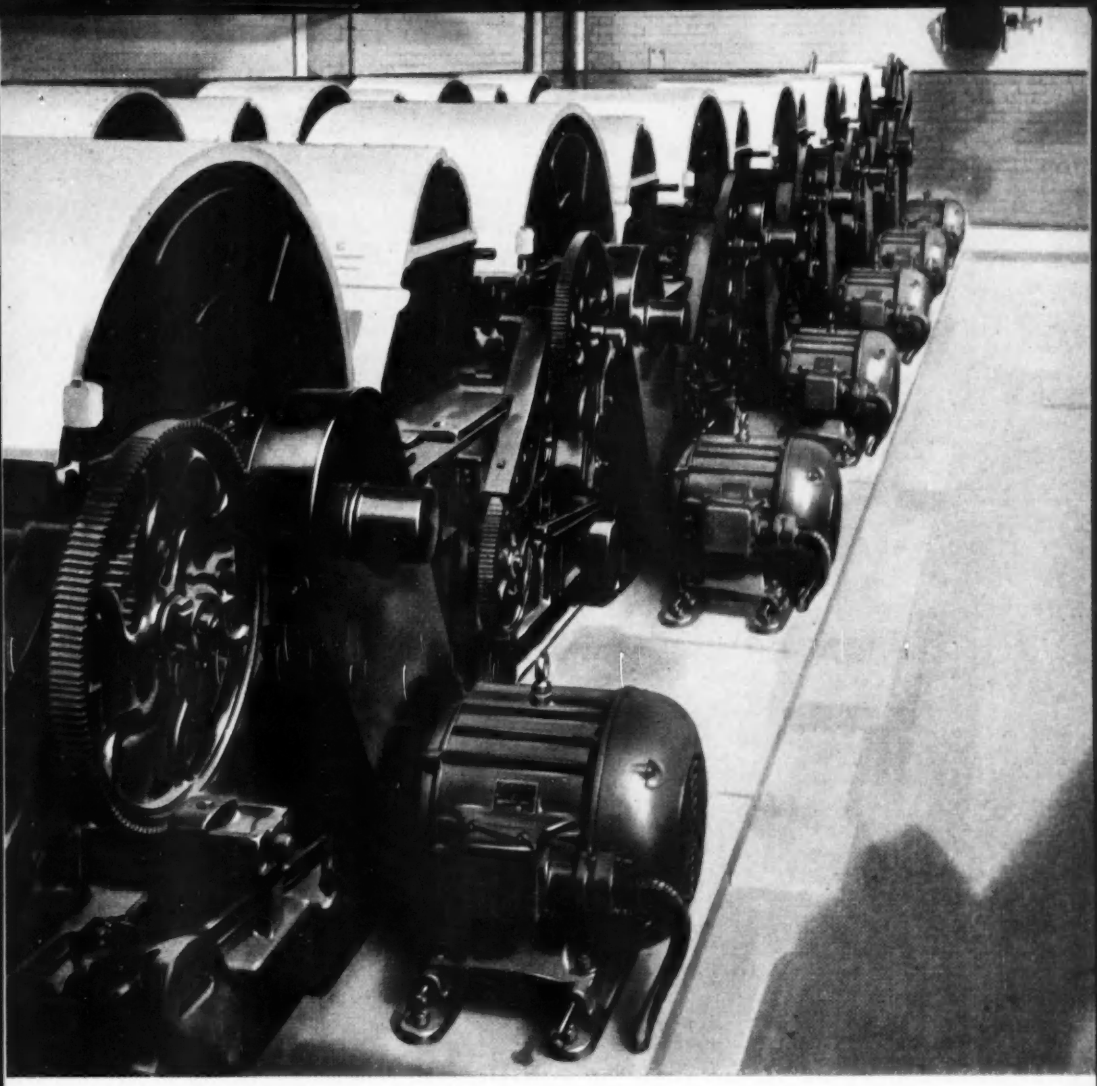

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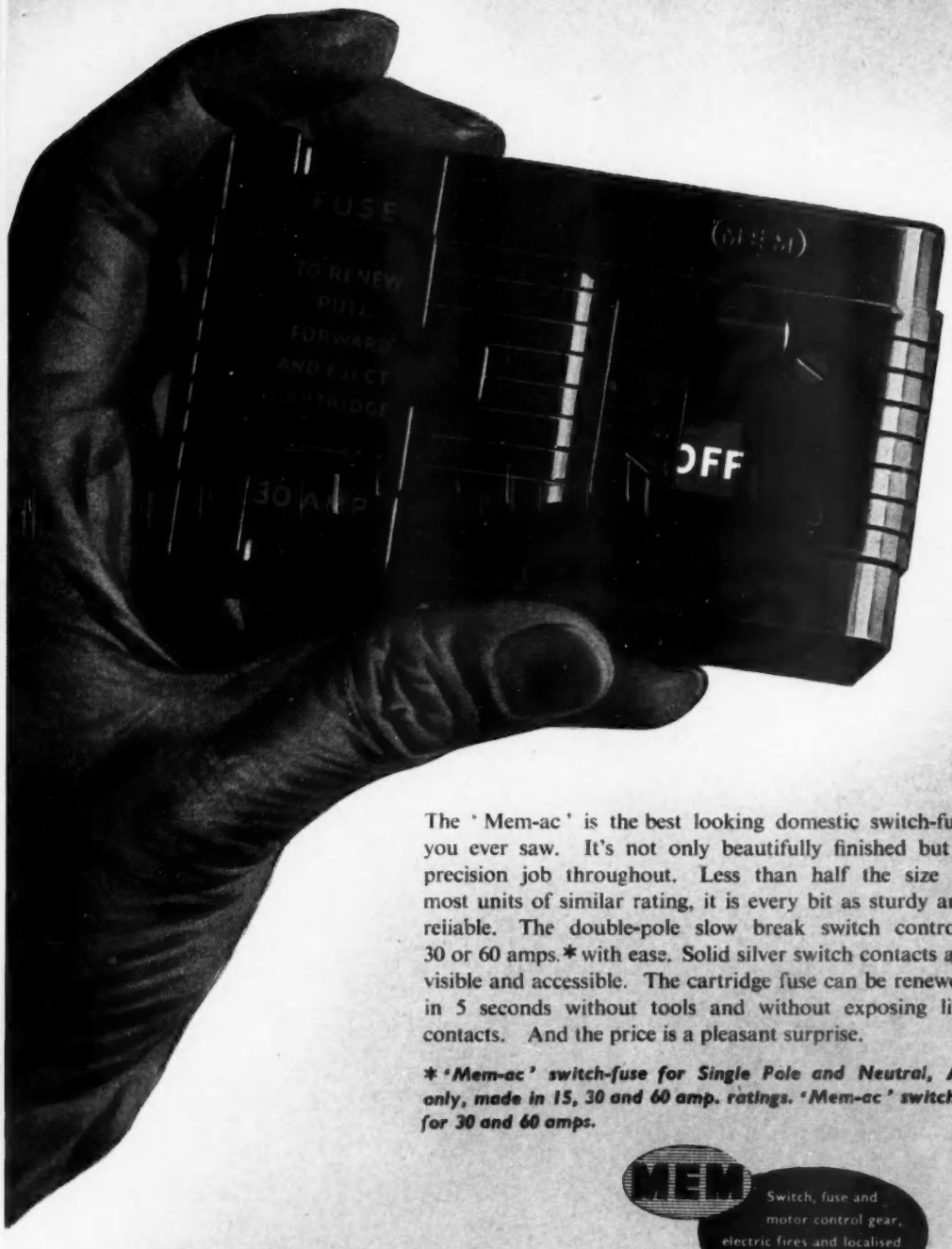

The 'Mem-ac' is the best looking domestic switch-fuse you ever saw. It's not only beautifully finished but a precision job throughout. Less than half the size of most units of similar rating, it is every bit as sturdy and reliable. The double-pole slow break switch controls 30 or 60 amps.* with ease. Solid silver switch contacts are visible and accessible. The cartridge fuse can be renewed in 5 seconds without tools and without exposing live contacts. And the price is a pleasant surprise.

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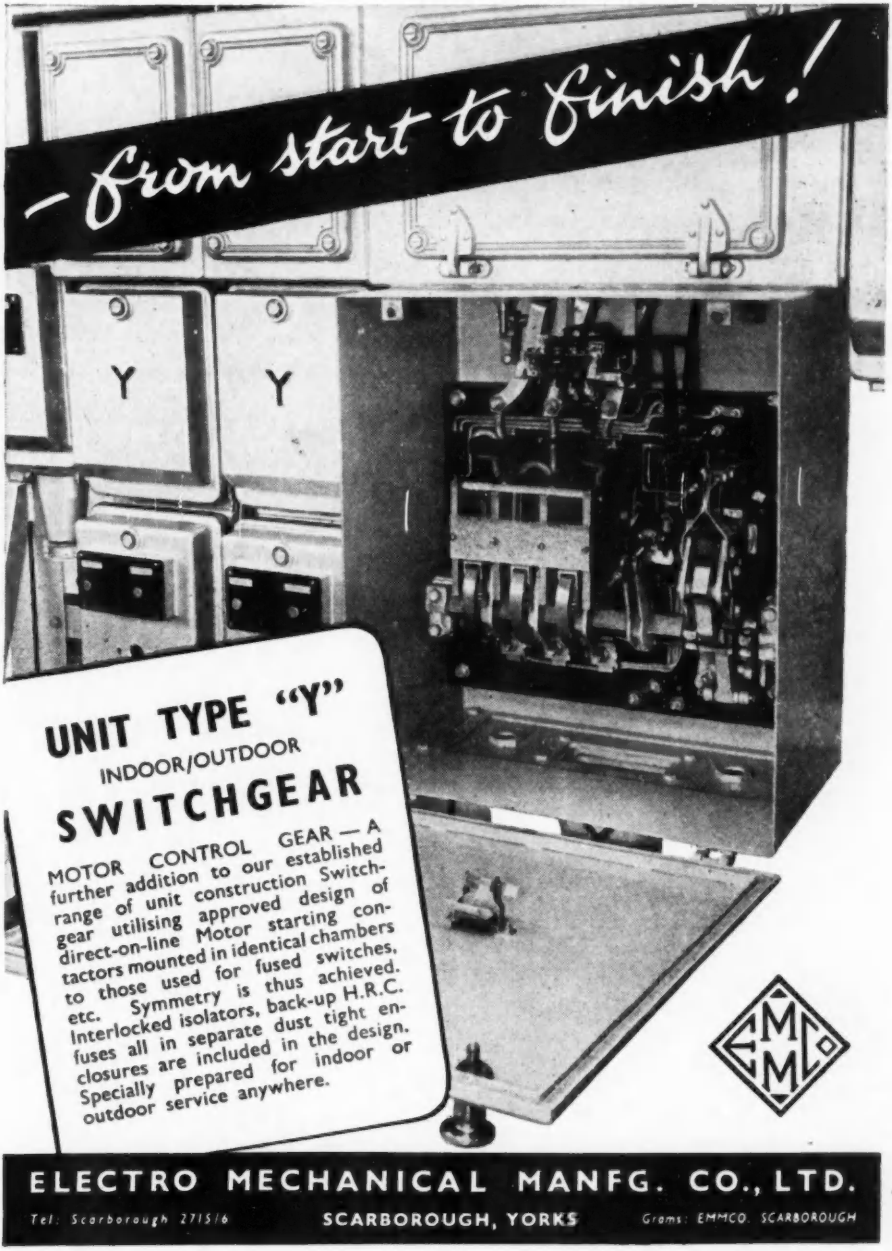
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Electrically Wound Time Switch

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The Horstmann Gear Co. Ltd. are proud to introduce their latest small electrically wound time switch, type "Y." The main features of this remarkably compact unit are:

- ★ Smallest electrically wound time switch on the market.
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- ★ 11-jewelled escapement, horizontally positioned to give best possible timekeeping.
- ★ Intermediate tappets can be provided for Solar dials. For hand-set dials two or four tappets can be supplied, as required.
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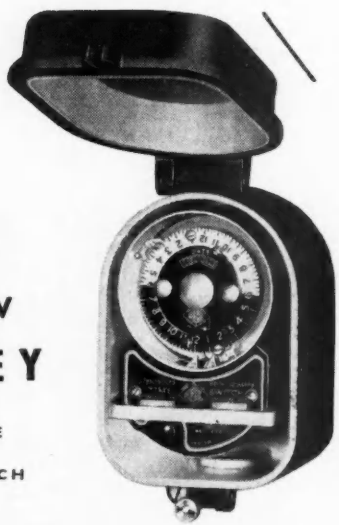

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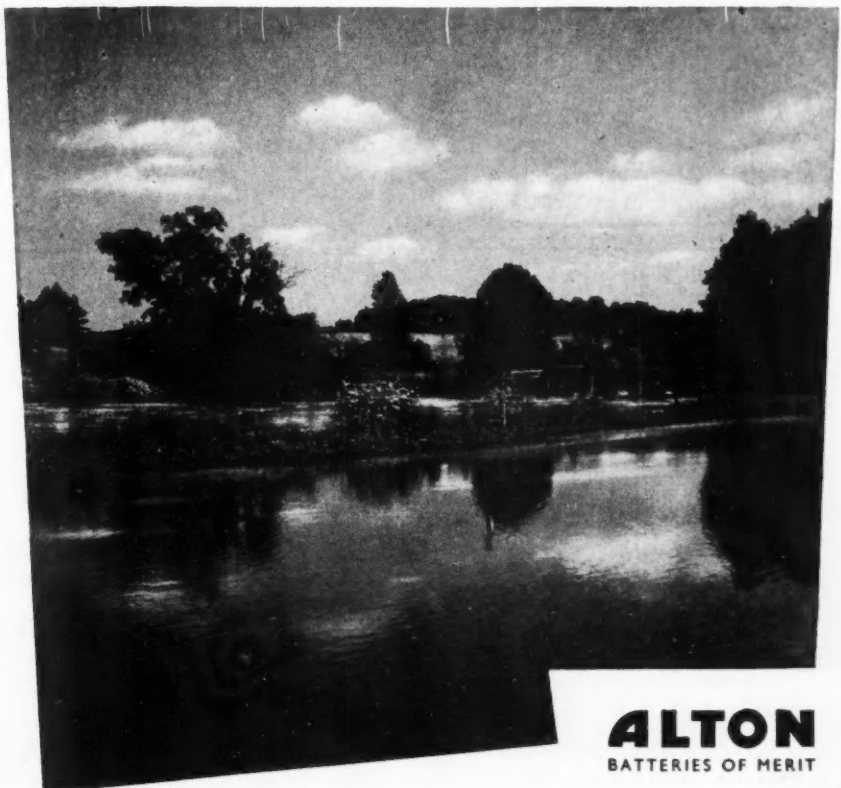

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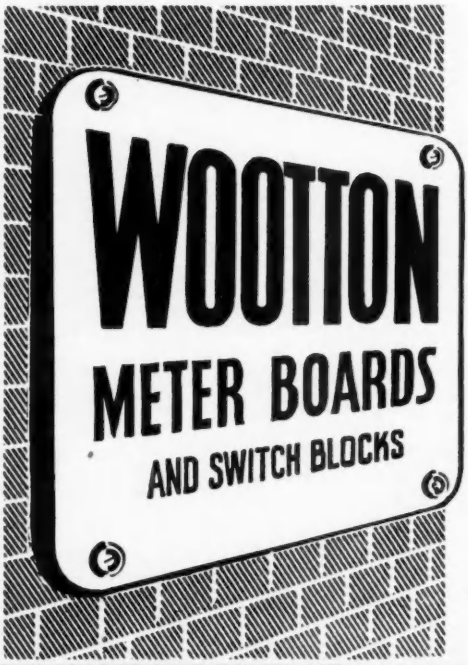

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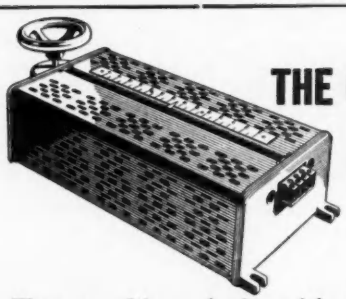

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The outstanding features are

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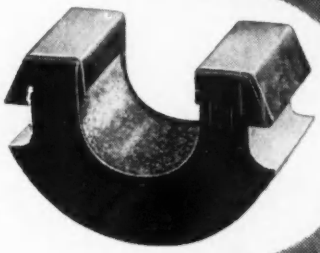

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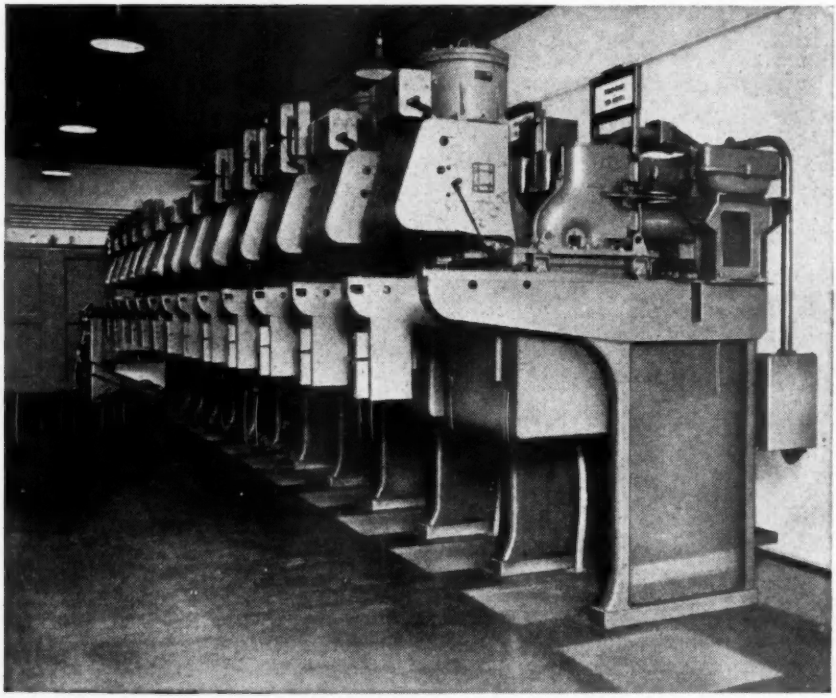

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If you want to talk switchgear

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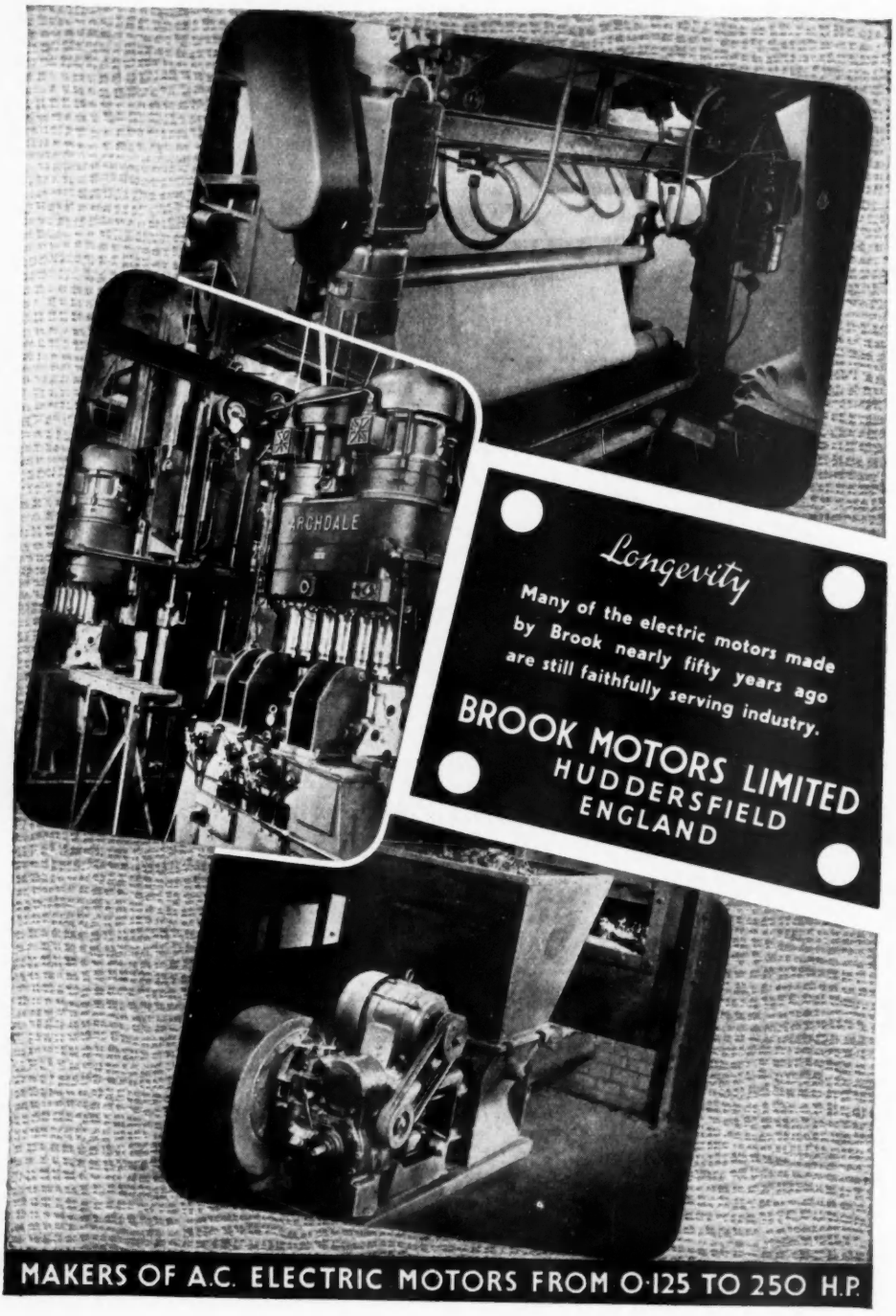
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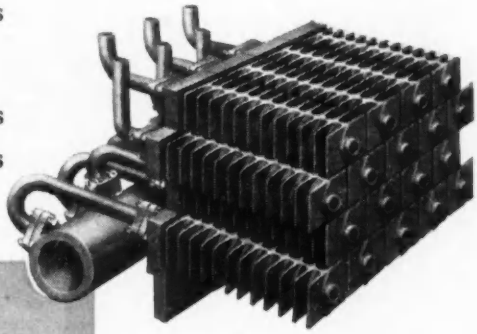

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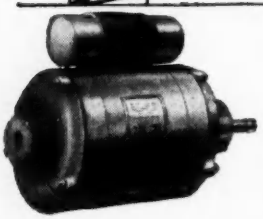

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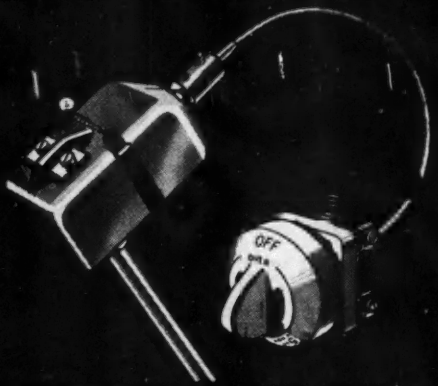

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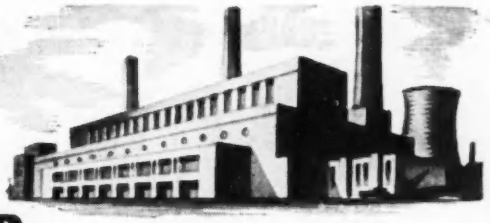

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by

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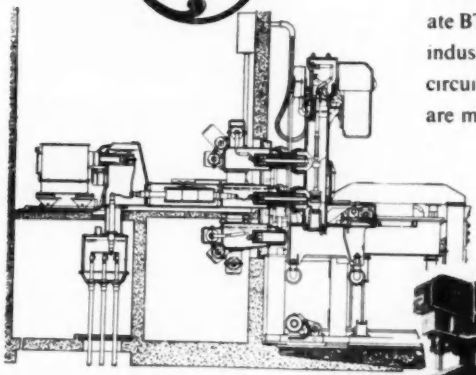
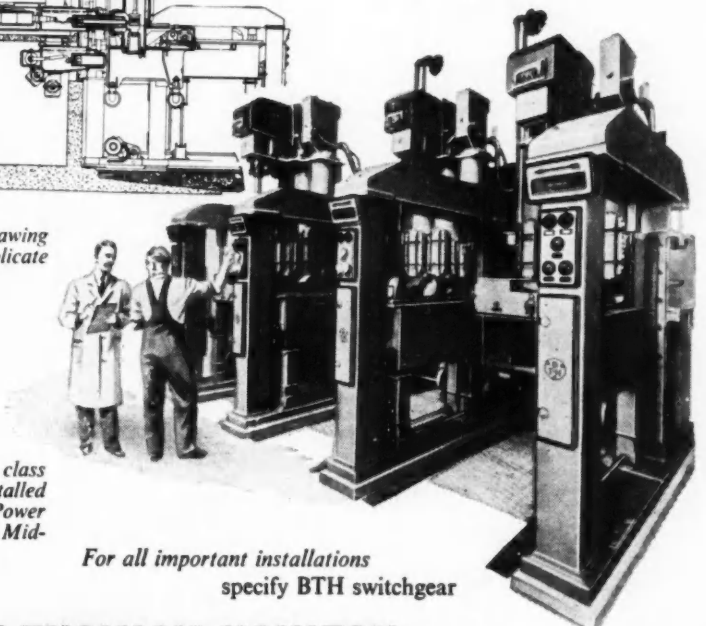


Cross-sectional drawing showing a typical duplicate busbar equipment.



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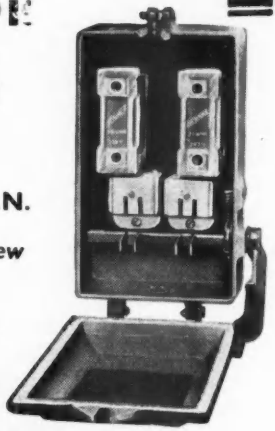

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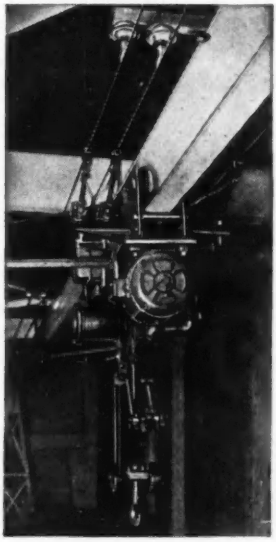

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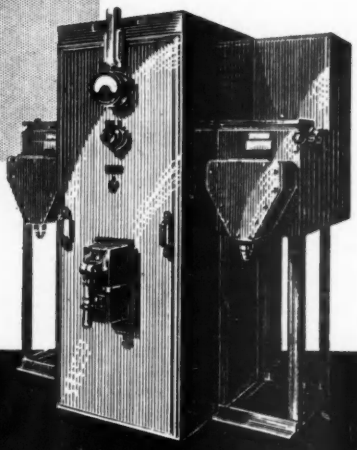

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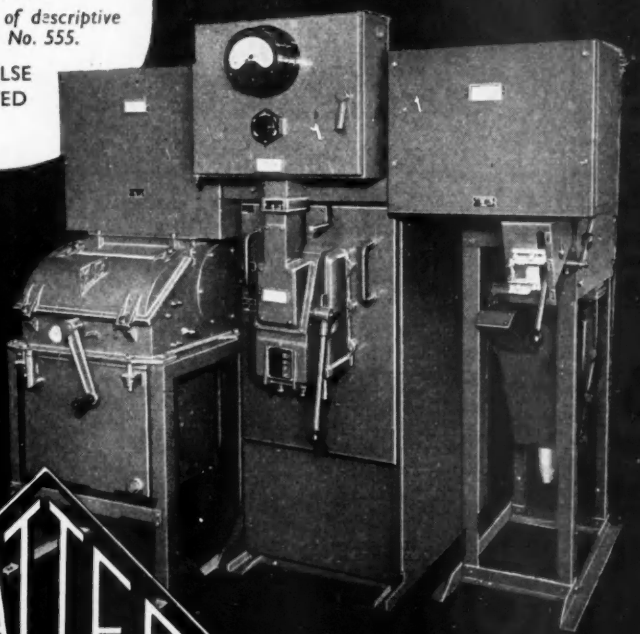

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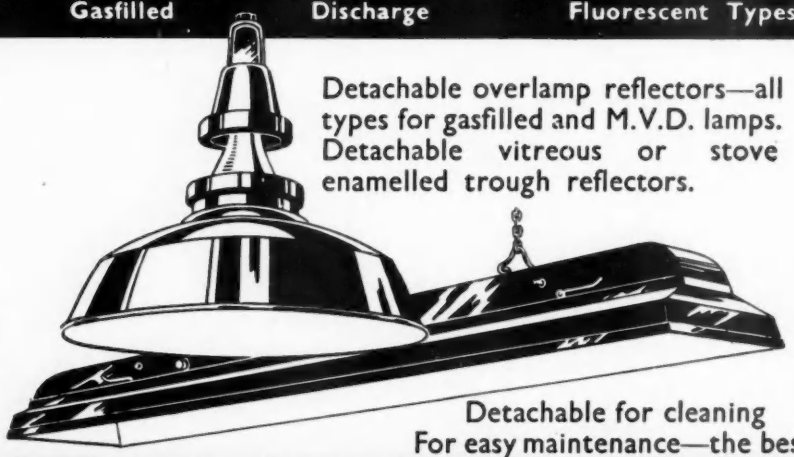

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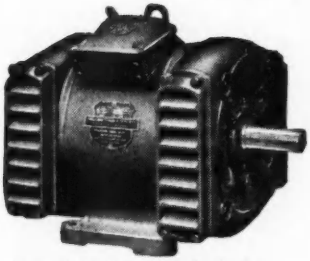

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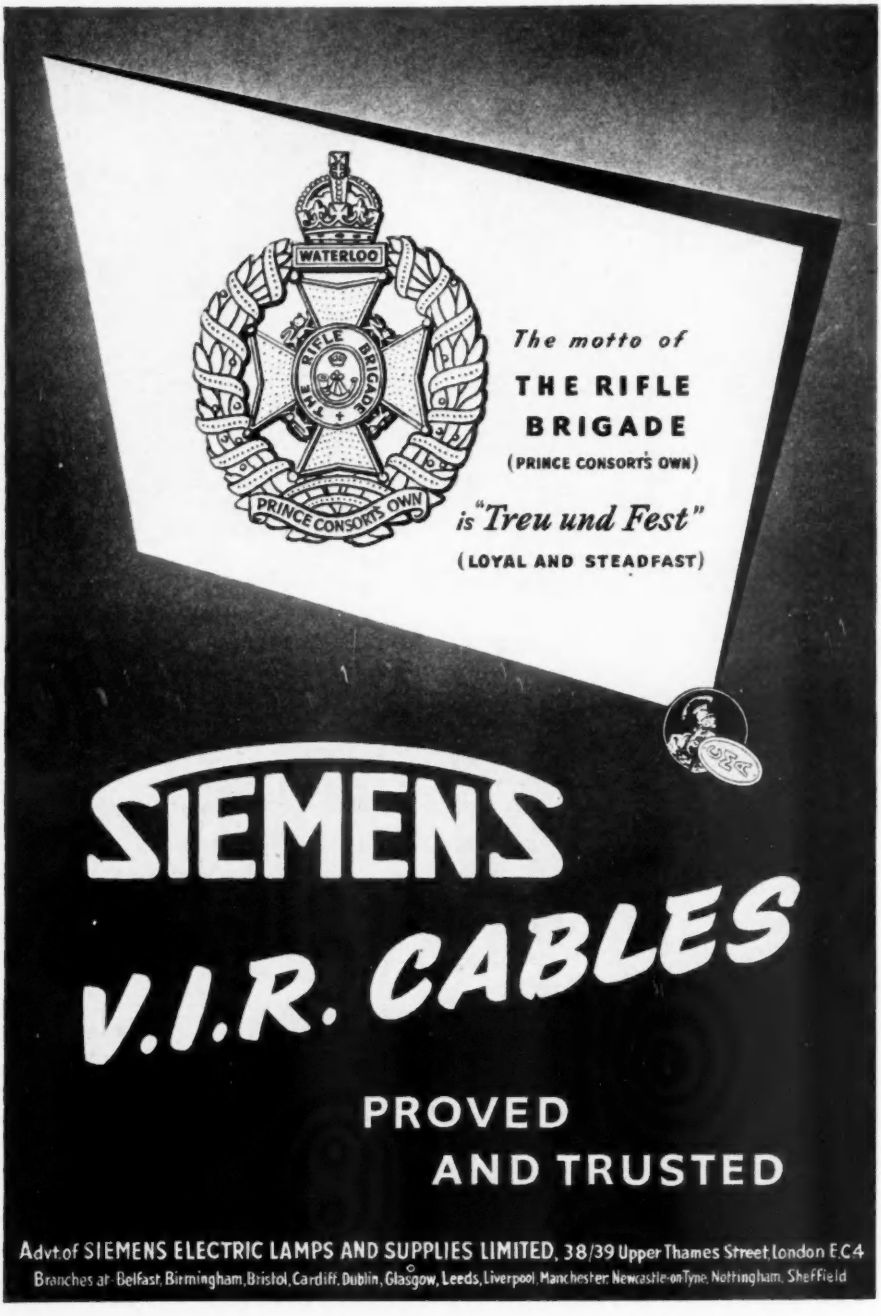
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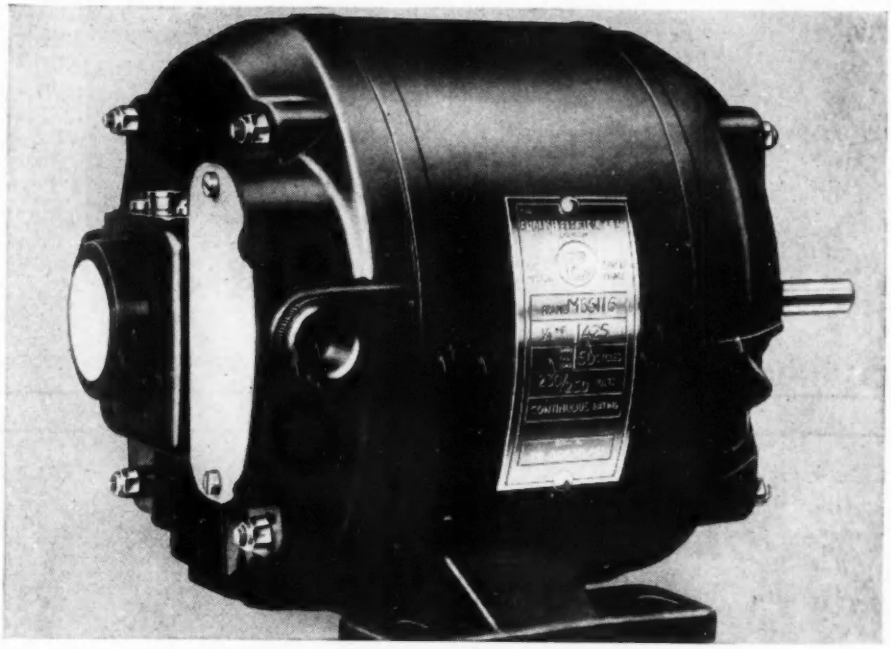

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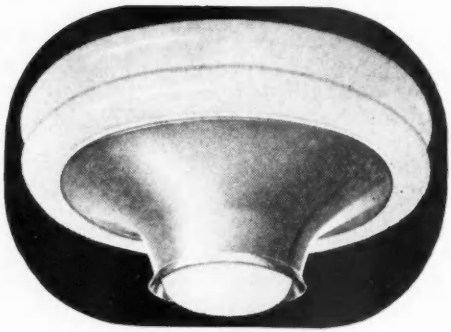

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A complete unit
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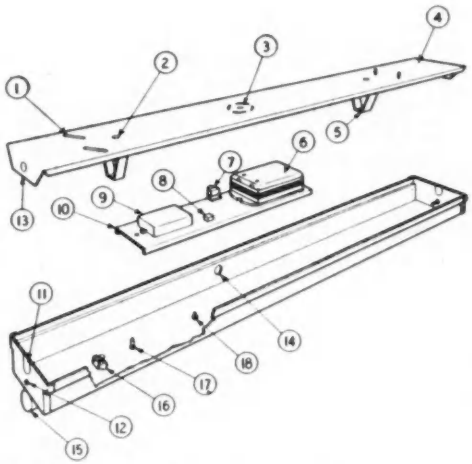

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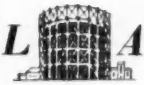
AND ADDITIONAL  APPLICATIONS

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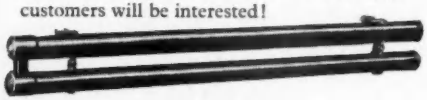

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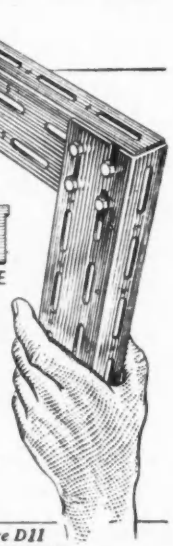

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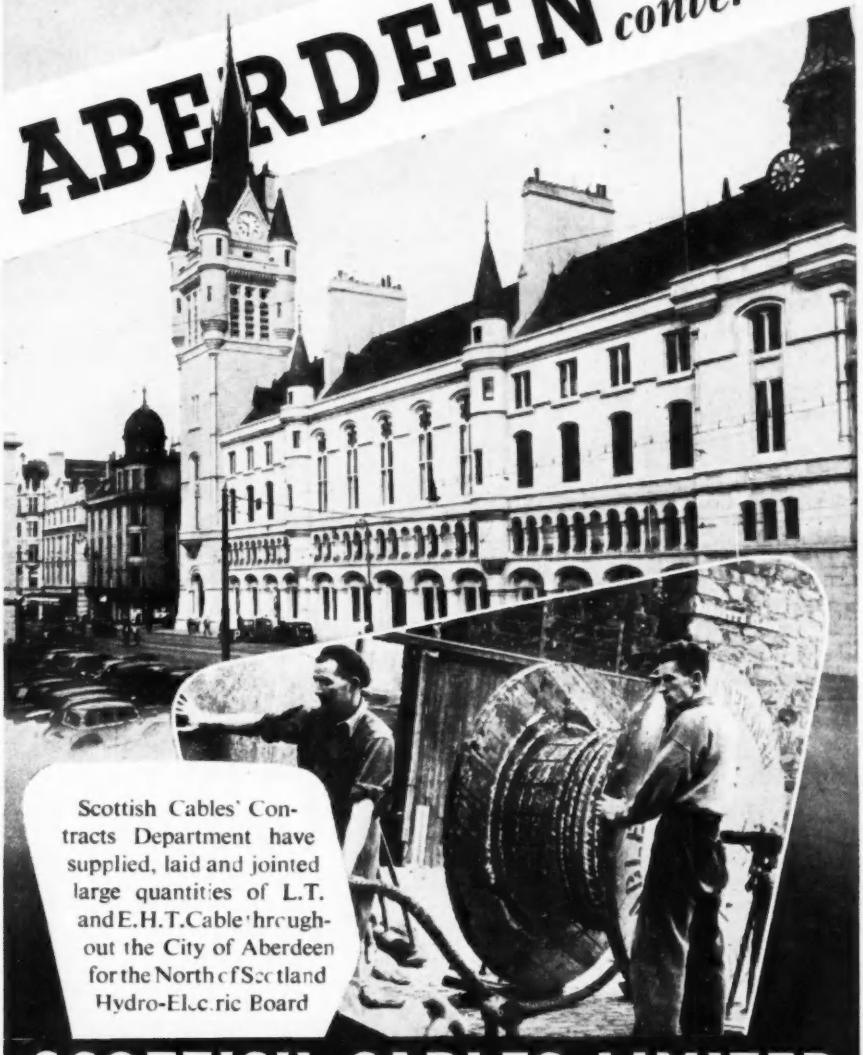

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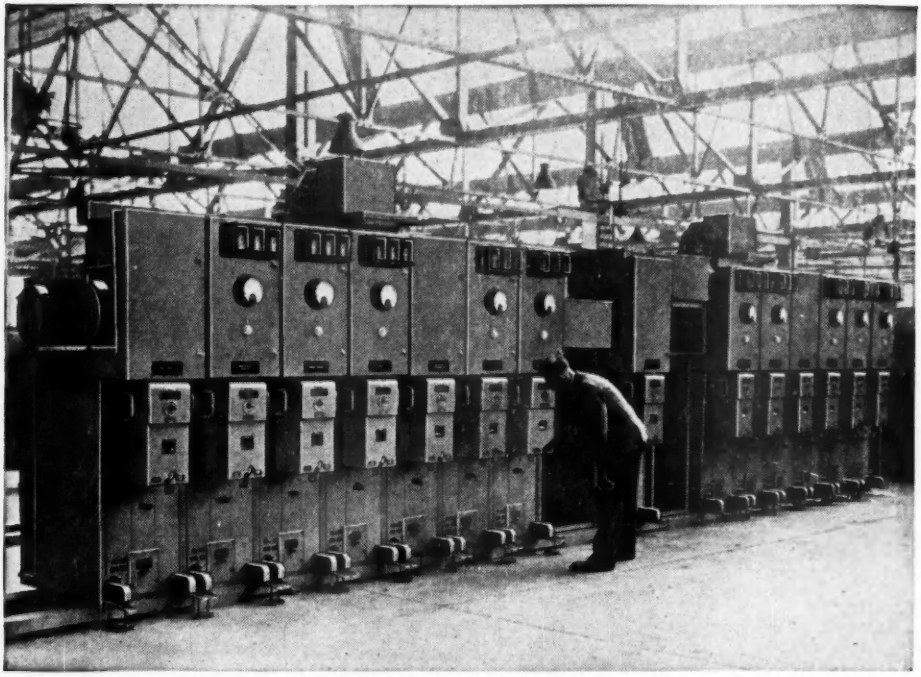
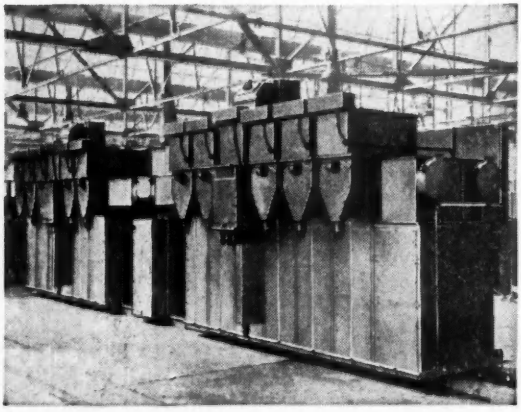


One of many



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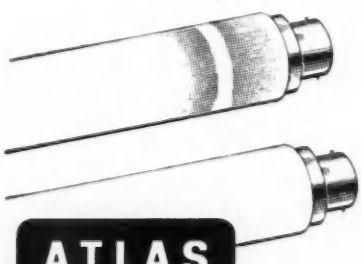

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ATLAS "double-life" FLUORESCENT LAMPS

TWICE THE LIFE —NO EXTRA COST!

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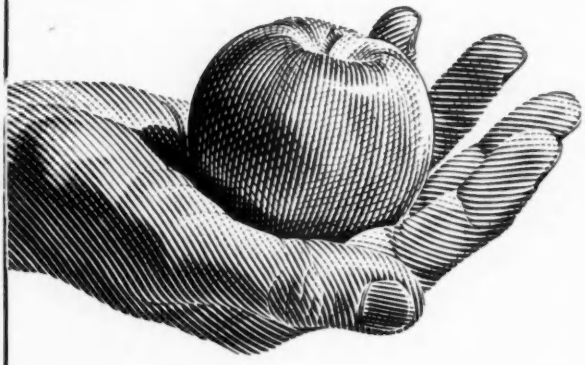

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Osram *the wonderful lamp*

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THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE KINGSWAY, LONDON, W.C.2

ELECTRICAL TIMES

Vol. 121 No. 3141 THURSDAY, 17 JANUARY 1952

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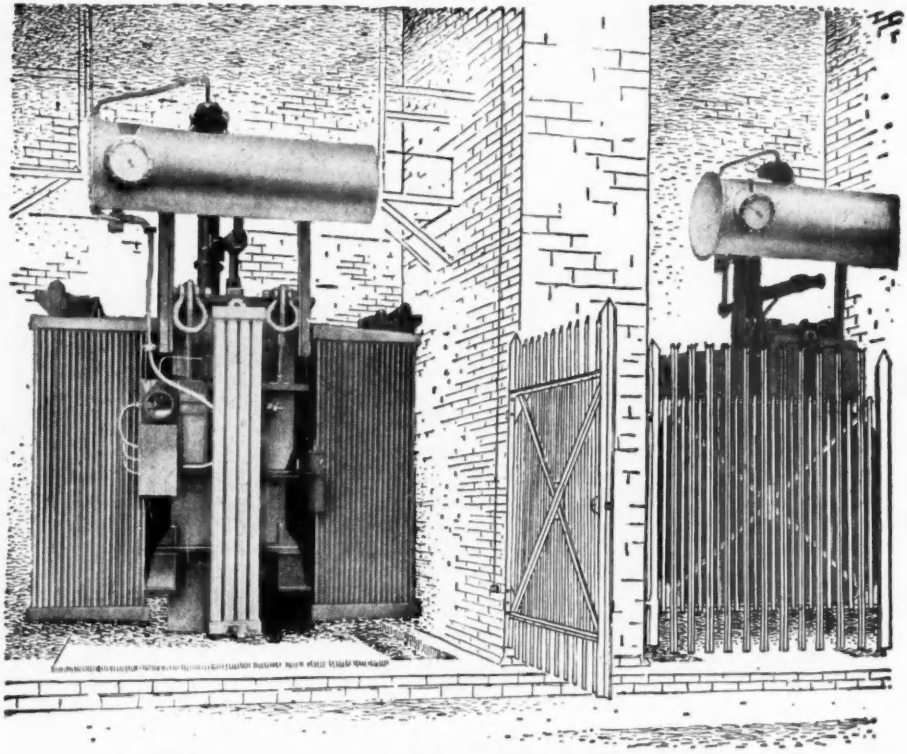


TRANSFORMERS

by G.E.C.

Two of the 5,000 kVA, 11,800/3,000 volt turbine house unit transformers at the Meaford Power Station of the B.E.A.
The whole of the electrical equipment for this Power Station was supplied by The G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Editorial

COAL LESS PROMISING

COAL supply has not been a serious problem for industry this winter so far, and stocks in all except the domestic field are high enough to make it unlikely to become one. But the shadow of an impending coal crisis seems a certain companion for some years to come, for when estimates of United Kingdom output during 1952 were presented at an O.E.E.C. meeting in Paris last week, they showed at 223·5 million tons an increase of only 1·3 million tons on what was realised in 1951. This is certainly quite unsatisfactory for industry as a whole in this country, and leaves the possibility of substantial increases in exports as distant as ever. From the electricity supply aspect, the outlook is made worse by the million-ton fall in open-cast coal output which is implicit in the estimates. During 1951, which was on average a somewhat mild year, coal burnt in power stations increased by 2·5 million tons. Something more than this must be planned for 1952, and a continued rise is part of the O.E.E.C. five-year plan for a 25% increase in production by member countries. Possibly caution in raising international hopes accounts for the pessimism of the forecast; in contrast SIR HUBERT HOULDSWORTH, the N.C.B. chairman, in a recent statement seemed to look for something better in the deep mined total for 1952. Unless his optimism proves well founded, 1952 seems likely to be a year of running down stocks for this country, with 1953 looming up as another crisis year.

COOKERS FOR SCRAP?

RUMOURS of possible supplies of steel from the U.S. tend to lighten the despair of industry over the allocation of steel for the first control period; second thoughts also lead to the belief that conditions during the year will not be so bad as these first allocations suggest. One of the difficulties which the steel industry faces is the falling off of scrap supplies, and a recent letter in the *Financial Times* suggested a useful additional source could be obtained by scrapping the two million obsolete gas cookers still in use and replacing them by a lighter sheet steel design. This, it is calculated, would yield 200,000 tons of scrap and at the same time provide more economical usage of fuel. Unfortunately such major change-over programmes demand major resources which are not easy to marshal at one time. Nevertheless, this factor of releasing scrap is one which should be kept in mind in any cooker programme, since it provides a counter view to that inhibitor to development, hire purchase finance restriction. Also, although electric cooker production has doubled in the past five years, there is still spare production capacity should it be required. The main difficulty lies in the supply of steel sheet, for the greater rolling capacity now available has done nothing to lessen the shortage of enamelling grade.

BOOM IN WATER HEATERS

ONE result of the present mild winter has been a relative absence of criticism of electric water heaters as a peak load problem, and less interest in their numbers. That they are none the less being widely installed is suggested by recently issued production figures, which show 1951 to have been the heaviest year for this type of appliance since 1947: the average monthly production at 24,500 units was half as much again as in 1949, the post-war low-spot year. Storage type heaters in particular are being manufactured at an increasing rate, and the 5,900/month average last year is about one-third the number of immersion heaters compared with the one-quarter ratio recorded a few years ago. No doubt coke shortage and uncertainty concerning future supplies have both played a considerable part in persuading people to install electric water heating. Since the supply position of coke and coal for

domestic use is unlikely to improve substantially in the coming year, it is to be expected that the tendency to install electric water heaters will remain. On the other hand, steel and other materials necessary for their manufacture will be severely restricted in supply, and on balance some drop in production seems probable. But the popular demand for these appliances has been well demonstrated, and should continue whatever the supply position.

SAVING STRUCTURAL STEEL

ECONOMY in use of steel, particularly structural steel, is vital at the present time, and it is for that reason that we draw attention this week to the turbine house construction of Acton Lane station. Hitherto the economies possible by the use of reinforced concrete have not been widely used in power stations, although Hams Hall "B" was a notable exception. One of the difficulties with the conventional reinforced concrete building has been the elaborate shuttering required for casting *in situ*. At Acton Lane, however, a pre-casting technique has been used which has led not only to a reduction in cost but, equally important, a great saving in constructional time. This installation has demonstrated the success of the technique and should lead to its wider adoption. It should be possible, also, in the future to extend further the saving in steel by the pre-stressing of the reinforcement in these pre-cast structures.

AERIAL LINES

LAST week's successful experiment by the Midlands Electricity Board in the use of a helicopter for overhead line erection was an encouraging demonstration of the willingness of supply engineers to make use of new techniques. In this instance it was not only convenience and economy in operation that provided the motive for departing from established methods: concern for the appearance of the countryside across which the line passes played a big part in the decision. This fact is particularly significant in relation to the Malvern Hills, agreed by all to be a beauty spot, since one continued complaint of official "country-lovers" who criticise schemes involving overhead line transmission is that the engineers concerned will always discover technical difficulties which prevent the modification of their plans in the interest of appearance. The inference is, of course, that the designers are being either purposely obstructive or obtusely conservative. Last week's exploit certainly shows that the case is otherwise, and fortunately it received wide publicity. Is it too much to hope that the more reasonable amongst the critics will absorb the meaning of the incident, and appreciate the integrity and initiative of those who serve them in the electricity supply industry?

TALKING OF MOTORS

RECTIFIER motor drives seem to be providing this session's talking point at I.E.E. meetings in London. In a paper on the subject read shortly before Christmas, it was suggested that lack of progress in their application was largely due to lack of information about their potentialities. That position should now be quite altered, for yet another paper, read last week, has discussed this method of motor control, this time as applied to newspaper presses. Between the two papers, pros and cons of the rectifier drive and of alternatives to it have been well threshed out. The d.c. motor fed from a grid-controlled rectifier and using static electro-magnetic devices for control, offers advantages of variable speed from an a.c. supply with relative absence of moving parts, and is particularly applicable where a wide speed range is required with smoothness of control. Yet in the case of a printing press, which seems to provide just these conditions, it is suggested that considerations of space and simplicity favour the a.c. commutator motor where no d.c. mains supply is available, though this view was not accepted by all who took part in the discussion. So the debate continues, but at least publicity is ensured, to the advantage of the rectifier drive.

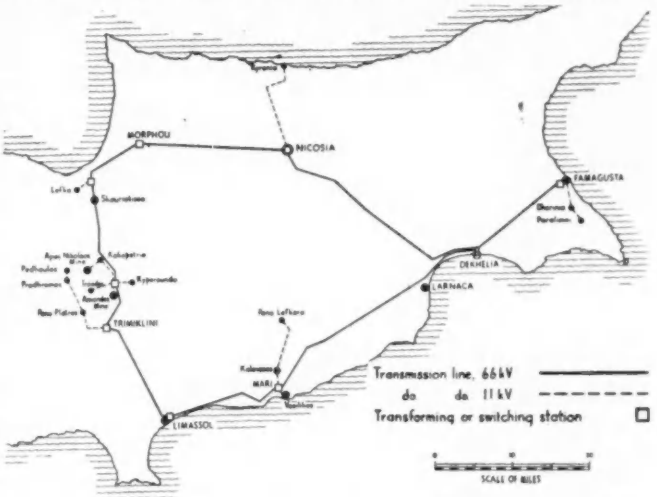
Meteor

Electrification in CYPRUS

PLANS ENVISAGE AN INTEGRATED GENERATION AND DISTRIBUTION SCHEME FOR WHOLE ISLAND

THE supply of electricity in the island of Cyprus is at present confined to a few municipalities with the areas immediately adjoining them, and to privately owned generating plants operated by several mining and company undertakings. These plants, which have an aggregate capacity of about 10,000 kW are scattered, and in some instances are old and uneconomical to run. In consequence the supply given is both inadequate and precarious. As an interim stop-gap a small amount of new plant has been provided, with the assistance of the Cyprus Government, to augment the most serious cases of inadequacy, but even then the existing demand will not be fully met.

The only solution is the establishment of a complete co-ordinated scheme covering the whole of the island, and in pursuit of this the Cyprus Government are proceeding with a project comprising a 70 MW generating station at Dekhelia, near Larnaca, on the South Coast, together with a distribution system covering all parts of the island.

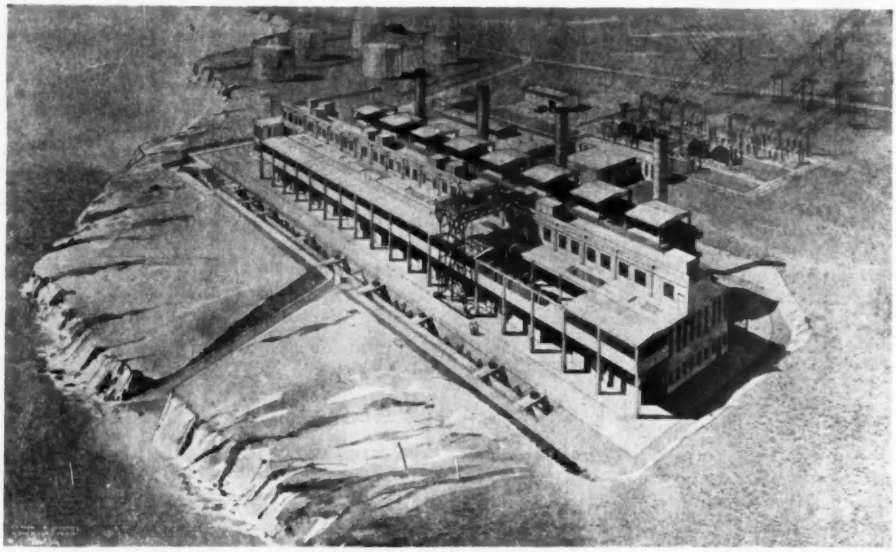


Map of centre section of Cyprus showing distribution scheme

Semi-Outdoor Design

Constructional work will be carried out in stages, the extent and timing of which will be determined by the rate of development of the demand, and the first stage, now in hand, includes part of the power station with 28 MW of plant, and the erection of the main 66 kV and 11 kV transmission lines to give bulk supplies to all principal towns (with the exception of Paphos on the extreme south-west) and the main mining and industrial centres. Probably the most interesting feature is the semi-outdoor design which has been adopted to reduce the extent of building work and the amount of structural steel required. This type of design can be seen from the accompanying illustrations. The central bay of the station houses most of the non-outdoor equipment including the house diesel engine generating plant, boiler feed pumps, evaporator plant and so on, and is the only part of the building which is fully enclosed. On the landward side are the boilers with their induced draught fans and chimneys, and these are outdoors with the exception of the boiler tops which have small flat roofs carried on the boiler structures to give some measure of protection.

Seaward is the turbine room divided into two bays, one containing the feed heating plant and steam valve control cubicles, and the other containing the main turbo-alternator sets. These two bays are only semi-enclosed, no outside walls being provided below the turbine operating floor. Between this floor and the roof above, the external sides are normally open, but can be closed if necessary by folding windows. The roof over the heater bay is concrete with removable hatchways wher.



An artist's impression of the completed station. Note the semi-outdoor construction

necessary, but the roof over the turbines is a light aluminium structure in sections to permit of easy removal.

Circulating water intake and outfall culverts run along the full length of the station between the turbine bay and the seashore, the screen chamber being at the inlet end of the intake culvert. Outdoor circulating water pumps of the vertical spindle type are used mounted directly above the culvert.

Control is exercised from a separate building located on the landward side of the station, between the station and the outdoor 66 kV switchgear compound. Workshops, stores, canteen and other ancillary buildings are located alongside, and adjacent to the power station is the main fuel oil tank storage and transfer pump house.

Generating Plant

The station is designed for turbine stop-valve steam conditions of 400 lb/sq in. 750° F, with the alternators generating at 11 kV 3-phase 50 c/s. For transmission this voltage is stepped up to 66 kV. In the first stage of development, three boilers will be installed, each rated at 90 klb/hr at 425 lb/sq in. 770° F, with feed water at 275° F. Initial oil storage will comprise three 3,000 ton welded steel tanks, with space for further similar tanks to be added as the station continues to develop. Three turbo-alternator sets will be installed for the first stage, two of 7,000 kW and one of 14,000 kW capacity. Each set has one l.p. and two h.p. bled steam feed heaters. These machines are of the manufacturer's standard design, except that in view of the semi-outdoor operating conditions special attention has been paid to the ventilation systems, particularly that of the alternator.

Crane Design

The turbine room crane is of unusual design for a power station, being of the semi-goliath outdoor type. The main hoist is of 35 tons capacity and the auxiliary hoist is of 5 tons. All motions are electrically operated and controlled. Over the feed pump bay is a conventional 10-ton crane with all motions manually operated. Station auxiliaries operate from a 415 volt 3-ph. 50 c/s system which is fed from the 11 kV system through two 1,000 kVA transformers.

For house service use is a 750 kW 415 V 3-ph. 50 c/s diesel engine generator running at 333 r.p.m. This set is, of course, of the indoor type, and together with its auxiliaries is located in an annexe to the main auxiliaries bay.

Switchgear

Main 415 volt switchgear is located on the upper floor of the auxiliaries bay, where single-busbar, metal-clad compound-filled gear having a rupturing capacity of 25 MVA is

being installed. This switchgear is in two separate sections, and further sections will be installed as required. Arrangements are made so that the house service alternator can supply any section of the switchboard. Smaller auxiliaries are supplied through a number of sub boards comprising switchfuse units.

Main 11 kV switchgear, housed in a switchroom forming part of the control building, is of the single-busbar, metal-clad, compound-filled type having a rupturing capacity of 500 MVA and arranged for remote operation from the control room. Two 15 MVA transformers (in the first stage) link the 11 kV switchgear with the 66 kV switchgear controlling the three outgoing transmission circuits. These transformers and their switchgear are of the outdoor type and are located in a switching compound.

Main Transmission

Two of the outgoing 66 kV lines form a ring circuit via Larnaca, Limassol, Amiandos, Lefka, Morphou, and Nicosia: the third circuit is a branch to Famagusta, which will ultimately be extended via Lefkoniko to Nicosia. Future plans envisage a spur line from Limassol to Paphos and Polis in the west, and another from Lefkoniko to Rizokarpassa in the north-east.

The 66 kV line construction comprises three 7/·161 steel-cored aluminium conductors in horizontal formation at 13 ft spacing, on two 44 ft wood poles with steel crossarms and two earth wires above. For the first two miles from Dekhelia on the lines toward Limassol and Nicosia, however, the same conductors are carried on steel towers to give a greater ground clearance. Steel poles have been adopted in the hill country where transport is difficult, and the two earth wires are carried through on these sections.

On the central 66 kV transmission ring there are two switching stations and five transforming stations. The former are located near Nicosia and Limassol, and the latter are at Larnaca, Mari, Trimiklini, Amiandos, Peristeronari (Lefka) and Morphou. Section switches in the ring are being provided at Trimiklini, Amiandos and Peristeronari to facilitate the isolation of the section in the hill country, as this part is most susceptible to damage by weather conditions.

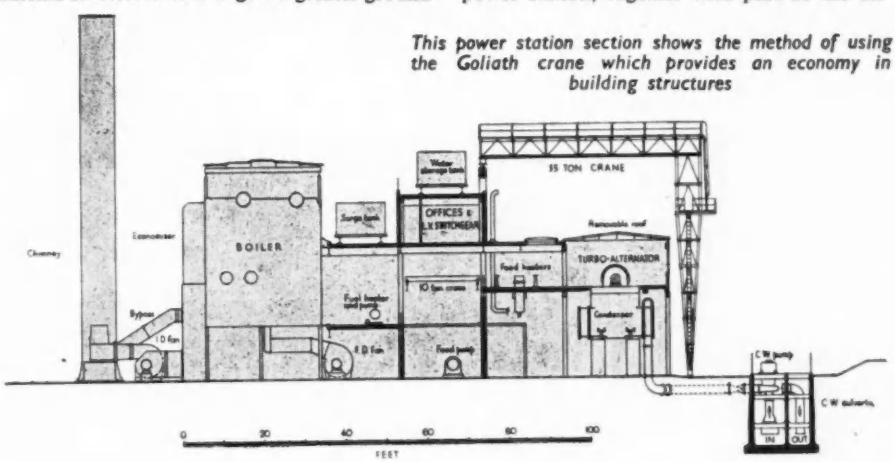
The transforming station at Famagusta is so arranged that it can be converted into a switching station should that be found necessary in the future.

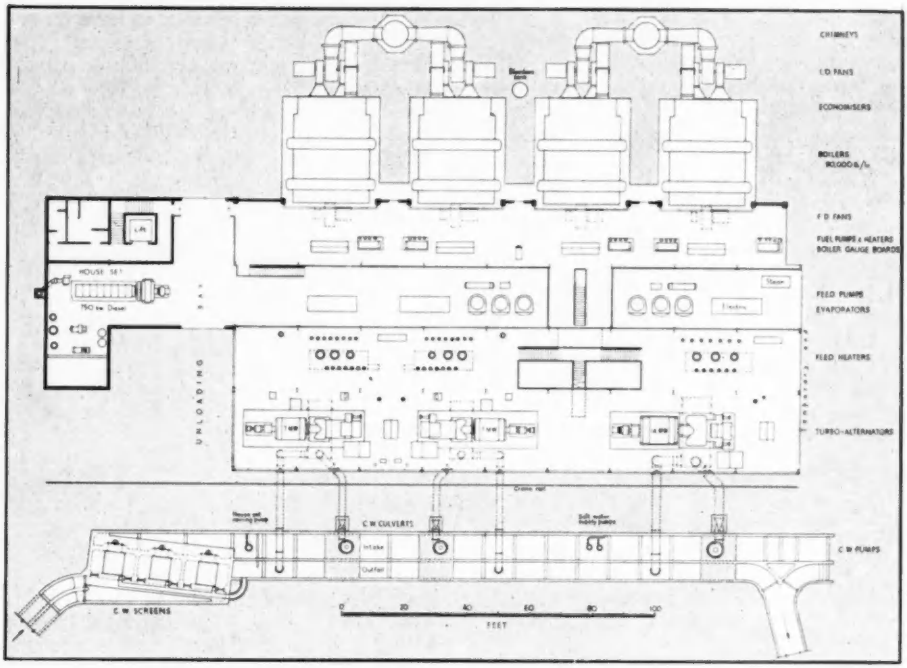
Transmission at 11 kV

Electrical energy from the substations and switching stations is taken at 11 kV to consumers by overhead line. The construction of these lines consists of copper conductors in horizontal flat formation on wood poles without earth wires. In the mountain districts however an overhead earth wire will be included. Supplies to the municipalities, certain mining companies, and electricity undertakings will be in bulk at 11 kV; other consumers will be on the low tension networks fed by 11,000/400 volt distribution transformers.

Cost of the initial installation of 28 MW of plant, together with buildings, oil storage tanks and other works on site, is expected to be about £47 per kW, and it is anticipated that the power station, together with part of the dis-

This power station section shows the method of using the Goliath crane which provides an economy in building structures





In this plan view can be seen the general arrangement of the equipment

tribution system will be in operation by July, 1952, depending on delivery.

Consulting engineers for the scheme are Messrs. Preece, Cardew and Rider, collaborating with Sir Cyril Kirkpatrick and Partners, who are responsible for the civil engineering.

Our thanks are due to the consultants for providing the information given above.

List of Contractors

Boilers: John Thompson Water Tube Boilers, Ltd.
Turbo-Alternators: Metropolitan-Vickers Electrical Export Co., Ltd.
House Diesel Set: Harland and Wolff, Ltd.
Pipework: John Thompson Water Tube Boilers, Ltd.
Feed Pumps and Evaporators: G. and J. Weir, Ltd.
Cranes: Sir William Arrol and Co., Ltd.
Circulating Water Pumps: W. H. Allen Sons and Co.
Circulating Water Screens: Ledward and Beckett, Ltd
Switchgear: Metropolitan-Vickers Electrical Export
H.V. Transformers: Metropolitan-Vickers Electrical Export Co., Ltd.
L.V. Transformers: Lindley Thompson Transformer and Service Co., Ltd.
Lift: J. and E. Hall, Ltd.
Bulk Fuel Oil Store: Whessoe, Ltd.
Civil Engineering: Sir Lindsay Parkinson and Co., Ltd., in association with the Titan Construction and Engineering Co. (Cyprus).
Structural Steelwork: T. W. Palmer and Co., Ltd.
Transmission Lines: B. I. Callender's Construction Co.

FUEL SAVING

SOME idea of the coal saving that could be made using a gas-turbine and steam-turbine combined cycle, was given by Mr. J. F. Field, the originator of the system, when he addressed a meeting of the Scottish Section of the Institute of Petroleum at Edinburgh last week.

Visualising an integration of the electricity-generation industry with the fuel burning industries, Mr. Field estimated that a saving of 50 million tons of coal per annum was possible, retaining the present output of power and heat. If the cycle could be applied to rail traffic, a further saving of 11 million tons a year was possible.

If, however, it became possible to push the upper temperature limit up to 1,600° F instead of 1,200° F on which these estimates were based, he thought that savings, in a properly integrated system could become as high as 100 million tons.

It was not unlikely, also, that somewhat similar ideas could be applied to small power plants, and if so it would double their existing thermal efficiency.

The advent of the gas turbine and the success of metallurgical research in providing alloys of sufficient strength for operation at elevated temperatures had opened up vast possibilities.

N. IRELAND DEVELOPMENTS

Rural Electrification Schemes Found Uneconomic

SATISFACTORY progress in 1951 is reported by the Chairman of the Northern Ireland Electricity Board. On the generating plant side, the fourth 31·5 MW turbo-alternator and its associated boilers were brought into commission early in the year, and marked the completion of Ballylumford generating station which has now attained its final capacity of 126 MW. To meet load development, the 110 kV system was extended from Drumnakelly, Portadown, to Omagh.

Rural Electrification

The Board has been engaged in extensive rural electrification schemes. In the two years 1950 and 1951, capital expenditure sanctioned for rural electrification amounted to no less than £2,663,299. As a result of this heavy outlay, supply of electricity would be made available to 5,406 farms and 9,809 other rural premises. The preliminary work associated with this, involving visits to farms to ascertain potential loads, the planning of lines and other work, bore heavily upon the Board's trained staff, despite recruitment which was carried out. Work and training proceeded together, until the rate of preparation of schemes became so much faster that the supply of materials became the limiting factor in preventing construction work being undertaken.

In 1950 approximately £633,000 of the capital expenditure on rural electrification was used, and the figure for 1951 is about £820,000. Thus in those two years the Board have completed schemes amounting to £1,453,000 against the £900,000 as advised by the Minister of Commerce in 1949.

The unfortunate feature was the inadequate use of electricity made by farmers when supplies became available. It is estimated that the maximum return on the £2,000,000 of capital expenditure sanctioned by the Board will not exceed 8% of the capital involved as against the 20% for an economic return.

During the year 1,320 farms were connected, bringing the total up to 5,000. The total number of consumers at the end of 1951 was 109,506, of which 69,553 were urban and 39,953 rural.

Estimates show that the number of units purchased and generated in 1951 will exceed 348 million, and that the number of units sold will exceed 292 million as against 252 million in 1950.

The great progress in construction work, despite the many difficulties in procuring essential material, is reflected in the number of miles of lines erected. The estimated figure of 330 miles for 1951 shows an increase of 100 miles over 1950.

In the circumstances, the Board have found it impossible for their constructional department, despite augmented staff, to keep even reasonable pace with the development works which have poured in for sanction, and they have therefore decided to complete all engagements entered into and promises made before embarking on the preparation of any further large schemes of rural development. At the present rate of deliveries of essential material it will be some years before the Board can overtake their present commitments.

TRENDS IN TELEVISION

A SURVEY of the present developments in television and some estimates of its future potentialities was given in a paper by Mr. K. S. Phillips presented at a meeting of the Association of Supervising Electrical Engineers on Tuesday.

He began by explaining that little progress had been made in the non-entertainment television field over the past three years, with the possible exception of hospital working where the students could now watch, on a 15 in. screen, an operation being performed.

In the entertainment field, the B.B.C. were now using high-power stations and extending the coverage. As far as receivers were concerned, the 12 in. screen had now become standard, although as the supply of 15 in. tubes improved, it was probable that a further increase would take place. Projection sets were little used in America although the situation was unresolved in this country.

After describing improvements made in set design and in cathode ray tubes, the author discussed future prospects. He thought that alternative programmes, local and national, were not far off. On colour television, he believed it was bound to come ultimately, and that it would be well to start up a system in parallel with black and white. Finally he mentioned cinema television, with particular reference to a Swiss system which used a continuously exhausted tube with a light controlling device consisting of a thin film of special oil between two interference gratings. The oil was distorted into patterns by the electron beam and could be used to modulate light from an arc projector. The main objection to this system was the extremely high initial cost.

Acton Lane Progress

Building Speed Accelerated by Use of Pre-cast Concrete Structure

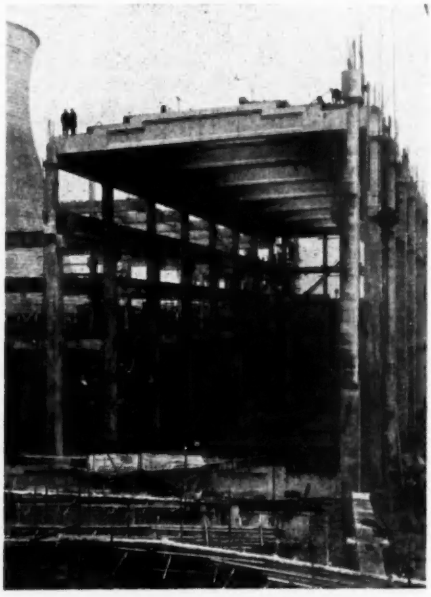
THE Acton Lane "B" station, situated in North West London near Harlesden, is designed to replace the "A" station, which was one of the pioneering London power stations, having been first commissioned in 1899. Most of the plant in the original station is time expired, some of it dating back to 1924. As, however, the existing station has an installed capacity of 158 MW, and also because the site is unsuitable for the erection of modern boiler plant, it was decided not to utilise the old site, but to build a new power station adjacent to it and to shut down the old station in stages.

Station Design

The new site is on land south of the Grand Junction Canal which was formerly used as a coal store and sports ground, and this was extended to some 13 acres by the acquisition of land which had formerly been used as a Ministry of Works coal store.

When completed the new station will house six 30 MW turbo-alternators and nine boilers, each of 240 klb/hr m.c.r. Steam conditions will be 600 lb/sq in. at 850° F at the turbine stop valve and the condenser vacuum is estimated at 28·5 in. Hg. The boilers are to be stoker fired, and grit arresting plant will be installed. Operation will be on the two-shift basis and a thermal efficiency of 25·5% is expected to be achieved.

The first section of the building, now under construction, will accommodate three sets and five boilers, of which two sets and three boilers are now on order. Commissioning of the first set is expected to take place in 1954 and the second set early in 1955.



Looking end on at the turbine house

Turbine House Structure

The most interesting feature of the work lies in the construction of the turbine house. The station is, broadly speaking, divided into three sections. The boiler house, which is a steel-framed structure; the turbine house, of pre-cast concrete; and the switch house and administrative offices, also of pre-cast concrete.

The main structure of the turbine house consists of two rows of principal columns 63 ft apart, the columns being spaced on 27 ft centres. On the south side, the columns support the boiler house and carry a load of 360 tons each in addition to their own load from the turbine house. The maximum load to be carried by any one main column is 764 tons. Pre-cast beams spanning 63 ft, with the underside 61 ft 3 in. from basement level, support the roof. Crane beams, supported by brackets cast on to the columns, will carry a 70-ton electrically operated crane.

The switch house is supported on the inner row of the turbine house columns, and by another set of columns 30 ft away. This building will have four storeys and will be about 60 ft high.

All the columns, main beams and secondary beams have been designed as single units, fabricated and cast in timber moulds on the ground and lifted into position by two 30-ton travelling derricks. When the members have been erected and trued into position, the *in situ* concrete floors will be poured, running in at all points of connection and picking up the reinforcing bars left protruding from the members, thus making beams, columns and floors into a monolithic structure.

In erection, the columns are temporarily

guyed in position until concreted solid into their bases, and the framework was so designed that each member is fitted into a slot, or rests on brackets without any further props or temporary support. The framework can remain safely thus until finally locked by the pouring of floors and consolidation of joints.

The principal columns are 30 in. by 30 in. section to crane level, where they change to 36 in. by 18 in. to roof level. They have a total pre-cast length of 66 ft and weigh about 30 tons each. For erection purposes they are lifted by one derrick in one piece. Main beams are also lifted in one piece and are 64 ft long, 6 ft deep at the centre and 18 in. wide. The weight is 26 tons and they are lifted into position by two derricks. Crane beams are 26½ ft long by 4 ft 6 in. deep and 18 in. wide. Each of these weighs 12¼ tons.

The crane girder erection is shown in this view

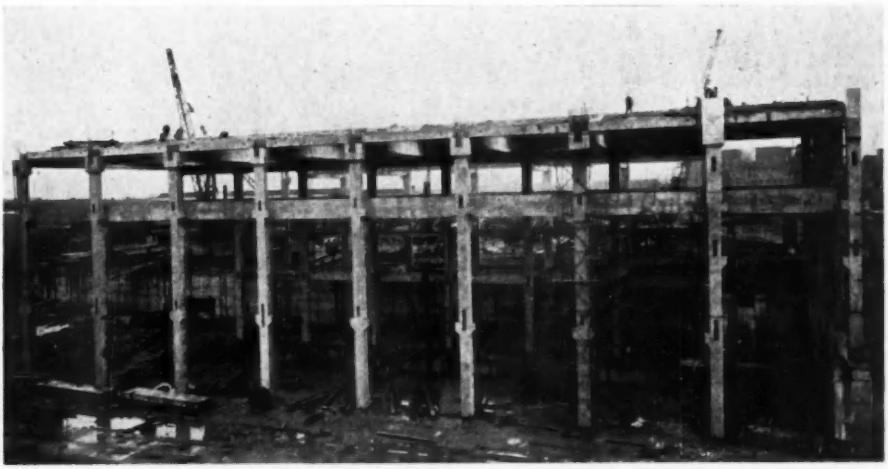
Erection

The building was constructed in complete bays, foundation to roof, moving in an east-west direction, so that every pre-cast member was erected and positioned in any one bay before the erection cranes moved forward.

Originally the contract was for the framework of 11 bays to be erected complete within 36 weeks from starting date which was August 15, 1951. The first pre-cast member at the east end was erected on October 21, 1951, the intervening time being taken up by preliminary works, plant erection, fabricating, casting and curing. By January 3, 1952, eight complete bays had been finished, the rate of erection then being one bay in five days.

Several advantages are introduced by this form of construction. The weight of reinforcement involved is about 330 tons, as compared with 1,000 tons if the building were steel framed. As the members are pre-cast, an enormous saving is made in shuttering and framework, and the concrete is of much higher grade than that obtained by cast *in situ* methods. The system is flexible, and last minute changes can be introduced at a much later stage than is possible with structural steelwork. This type of construction would readily adapt itself to the use of pre-stressed concrete with even greater savings in steel.

Our thanks are due to the B.E.A., Brian Colquhoun and Partners, the consultants, and Sir Robert McAlpine and Sons for information and for facilities to view the site.



The general construction showing the locking system is shown here

FUEL FOR POWER

Statistics show Coal Mining Achievements during 1951

MORE coal is the necessary corollary of the expanding power-station construction programme of the B.E.A. and of success in the drive for better productivity throughout industry. These considerations make generally important the recently published statistics for 1951, as a coal year, and the N.C.B. comments on them. Five years after vesting day for the coal industry, the National Coal Board can look back on a sustained average increase in the output of deep-mined coal of 3% per year. The 1951 total of 211·2 m. tons compares with a 1946 figure of 181 m. tons.

Early estimates for 1951 production have proved pessimistic, partly because of the success of Saturday working in the pits, which accounted for 12 m. tons as against 6 or 7 m. in the preceding three years. As compared with what output might have been in an "ideal" year, it is estimated that 9·1 m. tons of deep-mined coal were lost through recognised holidays, 0·8 m. through disputes and 0·4 m. from other causes. The total thus lost, 10·3 m. tons, compares closely with the previous year, when the estimated figure was 10·3 m. The production post-war record was achieved with 698,600 men on average at collieries, of whom 287,200 were face workers. This is 1,600 greater and 900 fewer, respectively, than in 1950, and these workers produced more coal per manshift.

In addition to the deep mined output, 11·0 m. tons of coal resulted from opencast mining operations, these being directly under the direction of the Ministry of Fuel and Power, and not of the N.C.B. Here there was a drop in output, due partly to programming and partly to the wet weather in the earlier part of the year. Taken in conjunction with deep-mined coal, the total "saleable output" as the official statistics put it, was 222·2 m. tons, 5·9 m. above the 1951 level. In addition 1·2 m. tons of coal were imported, principally from the U.S.A.

Uses

In Great Britain 207·9 m. tons of coal were used during 1951, while 3·7 m. tons went for ships bunkers and 7·9 m. tons were exported. Public utilities used 77·4 m. tons as against 74·0 m. tons in 1950. The principal increase was under the heading electricity, where the years consumption of 35·4 m. tons showed an increase of 2·5 m. tons or 7·8%. Gas, in comparison, used 27·4 m. tons, an increase of 4·3% on the preceding twelve months. The output of electricity from solid fuel fired stations during the year was 54,786 m. units, an increase of 4,669 m. units or 8·7%, calculated on a sent out basis.

Industry increased its consumption of coal from 44·6 m. tons to 45·5 m. tons, but increases in the engineering and other metal trades (0·1 m. tons to 3·9 m.) and other industries (1·0 m. tons to 33·5 m. tons) were offset by a fall of 0·3 m. tons in coal used for iron smelting and steel making, which in 1951 amounted to 8·0 m. tons.

Chairman's Comment

Speaking on the meaning of these statistics at a luncheon in London last week, Sir Hubert Houldsworth, Chairman of the National Coal Board, first commented on the success of the miners' response to Mr. Attlee's appeal during the 1949/50 winter. In respect of exports, he said that trade was developing well until the board was compelled, in the middle of 1950, to drastically reduce it. After this, the board did its best to honour all commitments, and to apply the necessary cuts in the manner that caused the least inconvenience to customers. It was noteworthy that there had been remarkably few complaints about the quality of the coal exported. Its reputation on the continent stood as high as ever.

Recruitment to the industry continued at an improved rate during 1951, but at the end of the year, 710,000 more men were needed, and not all of those available were where they were most wanted. Over a third of the board's 49 areas were badly short of men.

Up to October of last year, the N.C.B. had made an estimated surplus of £3¼ million, but subsequently sharp increases in the prices of timber and other materials used in mining, together with new wage awards, caused the position to deteriorate.

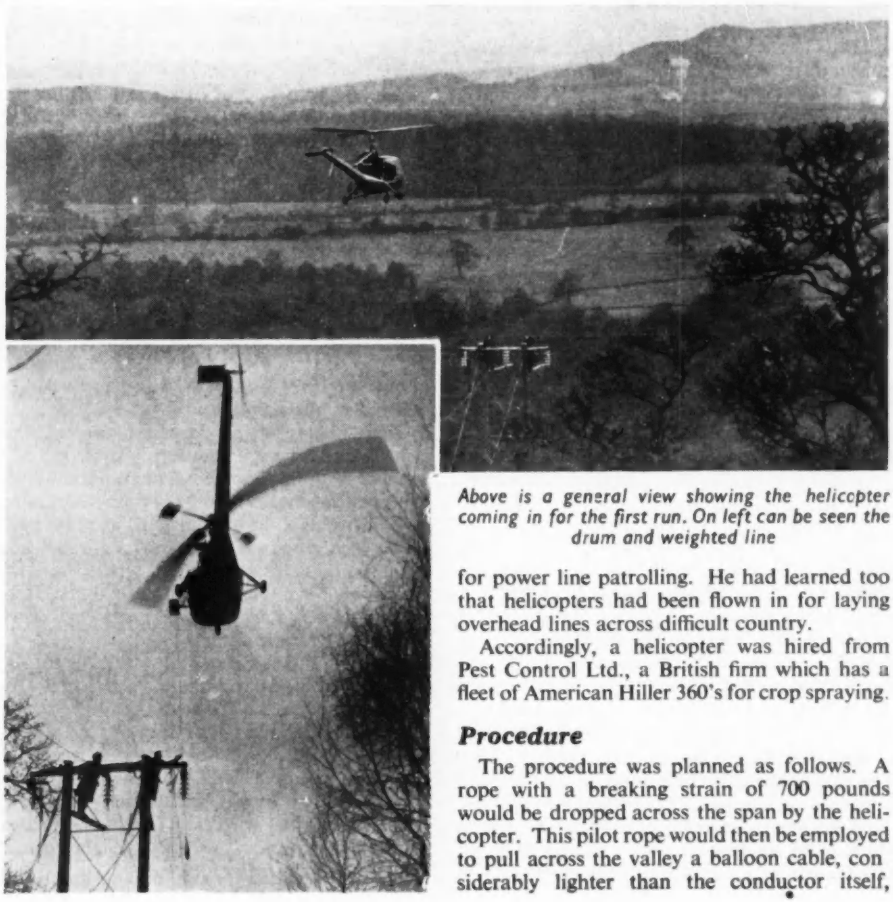
Little increase, said Sir Hubert, can be expected from Saturday overtime working and the manpower position could not be forecast. On the other hand the benefits of some of the board's short term reorganisation plans were beginning to be felt. One third of the 1951 increase came from improved output during the five-day week, and it was hoped to improve on this in 1952.

Laying Transmission Lines —THE NEW WAY

CONFRONTED with the problem of erecting an overhead transmission line through heavily wooded country, the Midlands Electricity Board recently used a method originally developed in America. A helicopter was hired to run a 1,280-foot span of a 66 kV line across a valley in the Malvern Hills, to provide reinforcement and an alternative supply for 20,000 to 30,000 Herefordshire consumers. The job was done in a matter of minutes. The alternative would have been cutting down hundreds of trees to clear a 30-foot-wide track through the woods.

The idea came from Mr. R. Mallet, deputy engineer of the Midlands Electricity Board. Mr. Mallet had been one of the 32 members of two Anglo-American Council on Productivity teams, representing the British electricity supply industry, who spent six weeks in the United States in 1949, under the technical assistance programme started by E.C.A.

When the authorities were trying to tackle the tough problem of running the power cable span over the woods, Mr. Mallet remembered his visit to the Tennessee Valley Authority in the U.S. He had seen helicopters being used there



Above is a general view showing the helicopter coming in for the first run. On left can be seen the drum and weighted line

for power line patrolling. He had learned too that helicopters had been flown in for laying overhead lines across difficult country.

Accordingly, a helicopter was hired from Pest Control Ltd., a British firm which has a fleet of American Hiller 360's for crop spraying.

Procedure

The procedure was planned as follows. A rope with a breaking strain of 700 pounds would be dropped across the span by the helicopter. This pilot rope would then be employed to pull across the valley a balloon cable, considerably lighter than the conductor itself,

having a breaking strain of 4½ tons. As soon as this had been winched across, this cable would in turn, be used to pull across one of the steel cored aluminium line conductors, together with a cord which would be utilised to bring back the steel wire, the latter being used again for pulling the two remaining conductors across. By adjusting the tensions, the steel wire and conductor would be kept clear of the trees during the operations.

The helicopter was specially adapted, a drum being mounted on the port side. This drum, carrying light rope and weighing about 50 pounds was assembled on the main structure of the aircraft. Facilities were provided for rewinding if necessary, and a brake was incorporated to prevent over-run. In addition, a split-pin release was employed so that, in case of jamming or emergency, the entire drum could be jettisoned. An important consideration was that the rope must essentially be kept in a dead straight line between the two poles, so that when it was pulled tight there would be no sideways drag to catch it in the treetops.

The weather on the scheduled day, January 8, was by no means ideal. Low dark clouds hung over the Malvern Hills, threatening rain, and there was a gusty wind of about 20 knots against the port side of the aircraft, tending to blow it off its course and create difficulties.

Visual aids had already been prepared—two patches of yellow paint marked the top of each pole and, in the valley, markers had been laid along the tops of the trees to give the pilot a straight line for his course. Two erection engineers, in climbing irons, stood at the top of each pole to guide the aircraft as it approached and collect the rope as it was dropped.

The pilot, Jimmy Harper, ex-R.A.F. Fighter Command pilot, took off from a nearby field, made a circuit into position, and came in for a first dry run. Hovering over the first pole, he dropped the rope, adequately weighted to ensure that it would fall vertically. But already it was obvious that the cross wind was making the drop difficult. At the last minute, the wind carried the aircraft over to the right and the rope dropped just out of reach of the engineers on the pole.

He immediately rewound the rope on to the drum, and came in for a second run. This time, he dropped the rope without difficulty.

It is expected that the method will have further application particularly in Wales and Scotland where it is sometimes necessary to lay overhead lines in difficult country over water or marshland, or in mountainous areas.

Loch Awe Waters to be Harnessed

MEMBERS of Argyll County Council were, last week, given advance information of the North of Scotland Hydro-Electric Board's proposal to develop hydro power in the neighbourhood of Loch Awe. The proposals were outlined by Mr. T. Lawrie, general manager of the Board, who was accompanied by Mr. A. A. Fulton, chief hydraulic engineer.

Scope of the Scheme

The exploitation will cost about £10 million and take between seven and ten years to complete. Total capacity will be about 55 MW and the output in the neighbourhood of 165 million units per annum.

The scheme will be in three sections, the main works being located a short way down the River Awe where it flows out of the loch. At this point a weir will be erected to control the level of the loch, although it would not affect the mean level which would vary between 125 ft o.d. in wet and 116 ft o.d. in dry weather as at present. A tunnel will, however, convey water from an intake near the weir to a power station on the shore of Loch Etive, east of the mouth of the River Awe. Compensation wate will be provided in sufficient quantity to enable fish to get up into Loch Awe, so that the important local fishing industry will be affected as little as possible.

The second section involved the building of a dam across the outlet of Loch Nant, a small loch situated some 600 ft above sea-level. This will have the effect of raising the water level from 607 to 680 ft o.d. From Loch Nant, water will be conveyed by tunnel and pipeline to a power station located on the banks of Loch Awe. Several tributaries at present feeding into Loch Awe will be diverted into this hydraulic system.

The establishment of an artificial storage area is envisaged in the third section. The Cruachan Burn is to be dammed to provide a reservoir with a top water level of 1,280 ft o.d. Apart from the normal catchment in this area, extra water supplies will be brought by diversion aqueducts from areas draining the north and south slopes of Ben Cruachan. A third power station using this head will be located on the shore of Loch Awe.

Electronic Instruments

Three Developments Described at I.E.E.

THE electronic valve, with its power of amplification combined with low input signal power, is being used to an ever-increasing extent in measuring devices where a very high level of accuracy is required, or where the actual quantities requiring measurement are extremely small. Three instruments using electronic methods were described at a meeting of the Institution of Electrical Engineers (Measurements Section), held last week. Of these one had been previously described in the Proceedings, but not at a meeting. This particular item was "A Bridge for the Measurement of the Dielectric Constants of Gases," by W. F. Lovering and L. Wiltshire. The problem in this case was to measure a small change in capacitance, which occurred when the test capacitor was first evacuated and then filled with the gas under test. An a.c. bridge was used with a valve amplifier to detect the out-of-balance. The bridge input was modulated r.f. which allowed the r.f. amplification to be followed by a diode detector and an a.f. amplifier. An oscillator giving 110 kc/s modulated at 400 c/s was used, the output being applied to a buffer amplifier, which was link-coupled to a coil, connected across two corners of the bridge, which was designed to give a resonant voltage magnification. The bridge output was applied to the detector amplifier, and registered either by a loudspeaker or by a valve voltmeter. For balancing purposes a micrometer variable capacitor was used with a range of 22-29 $\mu\mu$F in 2,200 divisions, giving a capacitance change of approximately $3{\cdot}4 \times 10^3$ $\mu\mu$F.

Capacitor Construction

The test capacitor was of a type widely used for the measurement of the dielectric constants of gases. It consisted of three concentric brass cylinders about 27cm long and 6·5cm dia spaced 1mm apart. The outermost and innermost cylinders which formed the l.v. plates of the capacitor were connected by brass spacing rings and the third cylinder was supported by six small quartz spacers fitted in adjusting screws.

The whole assembly was enclosed in a hermetically sealed brass cylinder 10cm diameter and the lead to the h.v. cylinder was brought out to a glass-to-metal seal.

When in operation the test capacitor was placed in a well-lagged oil-bath fitted with a heater and a stirrer. The connection between the capacitor and the rest of the instrument was made by a concentric lead, about 1 metre long, consisting of a brass rod 0·25in diameter inside a copper tube 0·75in diameter and spaced by three polystyrene discs which fitted tightly on the rod and in the tube.

Total capacitance of the test capacitor, the connecting lead and the micrometer variable capacitor, was about 1,020$\mu\mu$F. The three remaining capacitors in the bridge were constructed of brass with parallel plates and quartz insulation, each has a capacitance within 1% of 1,000$\mu\mu$F. After assembly these capacitors were subjected to repeated cycles of heating and cooling to remove residual strains.

Details were given of the method adopted for calibration, and of the results obtained. A sensitivity of one part in 6×10^6 was achieved. The work done on sulphur dioxide, water vapour and some other gases was also briefly reviewed in the paper.

Resistance and Conductance

The other two instruments were dealt with in a paper, "Two Electronic Resistance or Conductance Meters," by Dr. L. B. Turner. Again, a bridge circuit was used in both instruments, with electronic detectors. The megohmeter covers a range from 10,000 ohms to 1,120,000 megohms, and the microhmometer from 260 ohms to 330,000 megohms. Only a brief description was given of the megohmeter, as a detailed account had already been given by A. F. Boff in *Electronic Engineering*, 1950, 22, p. 286. The microhmometer was dealt with at some length, as it was developed from the megohmeter primarily for a special application wherein manual operation was undesirable, the range of measurable resistance was preferably to extend below 10 kilohms, and the heating of the specimen by the measuring current was to be a minimum. It gave its readings, not in terms of a resistance adjustment bringing the bridge into balance, but by showing on a galvanometer how much the bridge was out of balance. This feature, and the desire to retain the cheapness, accuracy and ease of reading of a linear scale, had determined that the information should be presented as a conductance and not as a resistance.

The only unsatisfactory feature in operation

was the need for occasional changes of setting to compensate for small erratic fluctuations. No loss of accuracy was involved but it was thought regrettable that these should be needed. The phenomenon—sporadic changes of anode current up to a few microamperes—was a phenomenon well known in d.c. amplifier circuits. Observation suggested that it was due to very slight changes in electrode positions, probably inseparable from thermal expansions and contractions which were resisted in the electrode assemblies by frictional constraints. A circuit had been devised for removing this defect from the microhmometer.

Although the microhmometer was developed from the megohmeter, each instrument offered some advantages over the other. In the megohmeter, since the valves were merely used to indicate if a bridge was balanced, and the balance could be checked by pressing a key as in the ordinary use of a Wheatstone bridge, accuracy did not depend on any setting of the valve circuits. Further when the unknown resistance was associated with a large capacitance, use of the key also quickened the process of establishing balance. On the other hand the reading was obtained only after adjusting a potentiometer to establish the balance.

In the microhmometer, although a previous setting operation was necessary to make the galvanometer scale indicate truly, no balance had to be found: in measuring the unknown conductance the only operation was the turning of the range scale until the pointer of the galvanometer lay on the scale.

Details were given of the theoretical considerations underlying the design, and of the practical methods adopted to improve accuracy and avoid errors which might be introduced due to valve replacement.

DISCUSSION

MR. J. F. COALES (Elliott Bros.) said that both Dr. Turner's instruments were notable in that they were very simple bridges which had been extended in their range by the use of electronics. By the use of electronics Dr. Turner killed two birds with one stone; not only did he increase the sensitivity, and therefore the accuracy, for the very high resistances in which he was interested, but he also made them foolproof because the current through the valve was limited and therefore could not damage his indicating instrument.

MR. J. K. WEBB (S. T. and C.), in a written communication, expressed the view that Dr. Turner's proposals for measuring high resistances were rather off the rails, and their publication at this juncture was to be deprecated, as they might be misleading. Any system which required the use of standards of resistance having such enormously high values was objectionable. Fortunately for those who wanted to measure high resistances, there was an alternative method available in commercial form which employed resistance standards smaller by a factor of about 100 than those required in Dr. Turner's system, and the advantages which accrued from the use of such relatively lower values were overwhelming.

MR. G. R. TAYLOR (Electronic Instruments) mentioned that the instrument referred to by Mr. Webb was used particularly for the measurement of leakage in cables and condensers and insulating materials. The resistances had been kept down to a figure of 50 megohms.

MR. A. C. LYNCH (P.O. Research Station) emphasised the fact that Dr. Turner was able to use an electrometer valve as a cathode follower. An electrometer valve used to mean something having an amplification factor of 1, and Dr. Turner's electrometer valve was probably only an ordinary commercial h.f. pentode greatly underrun, but it had an amplification factor of about 20 and could be used as a cathode follower, which was undoubtedly an advantage.

He thought that Messrs. Lovering and Wiltshire were right in trying to make their balance independent of frequency, but had gone to a great deal of unnecessary trouble in their effort to do it. If worried about frequency, a crystal oscillator should be used or, if that was regarded as unnecessarily elaborate, there should be no difficulty in getting an oscillator with a stability of about 100 p.p.m. and using it with a Schering bridge.

DR. L. ESSEN (N.P.L.), who also dealt with the paper by Messrs. Lovering and Wiltshire, said that there had been a great many measurements of the dielectric constants of gases at low radio frequencies, and most of them had used the heterodyne method. The authors had shown that the bridge method could be made as accurate as any low-frequency heterodyne method, but probably both methods had now been superseded by the cavity resonator method, which could be made very precise and seemed to have all the advantages, unless there was some particular reason for wanting the value at a low frequency.

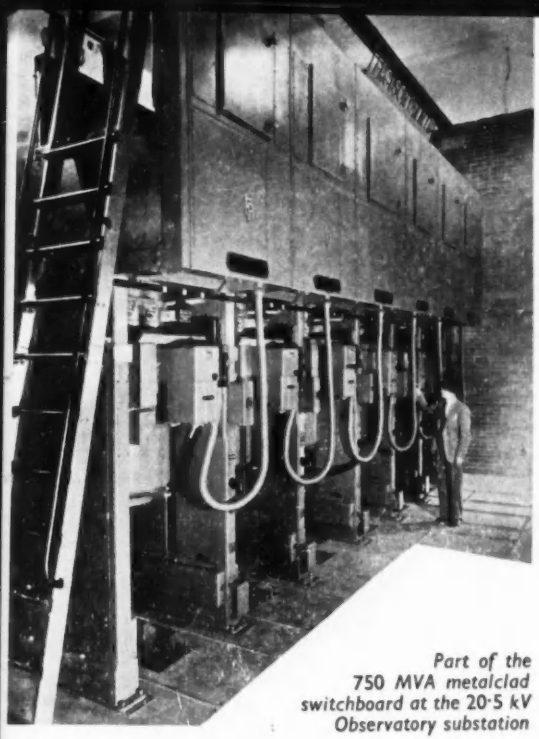
MR. C. G. GARTON (E.R.A) made a number of detailed comments on the dielectric constants of various gases as measured by several workers and given in the paper by Messrs. Lovering and Wiltshire, and said that they emphasised how careful it was necessary to be, when dealing with dry air, to see that the air was thoroughly dry. It was easy to fail to dry the air to something better than 1% relative humidity and not to detect that that amount of humidity was present.

MR. P. LEWIS, referring to Dr. Turner's paper, suggested that the effect of moisture might be overcome by enclosing the set of standards in a sealed compartment with a drying agent such as silica gel.

MR. A. C. SIM raised one or two detailed points on the papers, and Dr. Turner and Mr. Wiltshire replied to the discussion.

Distribution in Johannesburg

First stage of system reorganisation has now been completed



Part of the 750 MVA metalclad switchboard at the 20·5 kV Observatory substation

THE rapid growth of the urban and industrial areas within the municipality of the city of Johannesburg has created an ever-increasing demand for electrical power with the consequence that the city's power resources have been greatly expanded.

At the present time, the city's requirements are obtained from the original city power station with a maximum output of 120 MVA and the Orlando power station, situated about 9 miles south-west of the centre of the city, with an ultimate output of 300 MVA. To cater for peak load periods, the system is interconnected with that of the Electricity Supply Commission, Rand Undertaking, and a future power station to be called Kelvin is now being planned near Kempton Park, situated on the north-eastern outskirts of the municipal area. Its initial installed generating capacity will be 90 MVA, with provision for extension to 360 MVA.

Main Distribution System

The main system of distribution in the municipal area will ultimately comprise an "inner" and "outer" ring at 88 kV, by overhead line around the city, interconnecting the major power resources of Orlando, the future Kelvin power station, and an 88 kV switch yard, at which point interconnection with the Electricity Supply Commission Rand Undertaking system will be effected, together with radial feeds to zonal 88/20·5 kV substations.

The whole of the output of the City power station is absorbed within the central zone of the city, and this station will be radially connected to the 88 kV system.

The remainder of the municipal area will be divided into six zones of supply, which will be fed by radial feeders from the 88 kV ring.

In each of these zones provision is made for two 88/20·5 kV step-down substations, each to be provided with two 40 MVA 88/20·5 kV stepdown transformers, and the main 20·5 kV switchgear. This switchgear will in each case feed an ultimate of three 20·5/6·6 kV substations for the secondary 6·6 kV distribution.

The first stage of development is nearing completion and caters for the establishment of the "outer" 88 kV ring. With the final arrangement the only coupling between the 88 kV rings will be via the 40 MVA 88/20·5 kV stepdown transformers, thereby limiting the potential fault on the 20·5 kV bars to 750 MVA.

Each 88 kV radial feed to a zonal substation will comprise two circuits and each group of four, including the 'inner' and 'outer' rings, will comprise a unit with maximum loading limited to 120 MVA. The two 88/20·5 kV substations in each zone will normally be independent, but provision is made for automatic interconnection on the 20·5 kV side so that if any 88 kV circuit is lost the load on the remaining three circuits will be increased to 40 MVA each, thus maintaining the maximum potential loading of 120 MVA within the zone.

As the "inner" and "outer" 88 kV rings may be out of synchronism after a fault with the 20 kV interconnector closed, check synchronising reclosure of the 20 kV incoming oil circuit breaker is necessary.

Messrs. Ferguson Pailin Ltd. (through their South African agents, Messrs. Rice and Diethelm Ltd.) are supplying the 20·5 kV

switchgear for three of these major substations and have just completed the Observatory substation installation, which was formally opened on January 10, last week.

Switchgear Arrangement

A typical switchboard comprises type VTRP.36 1,200 amp 750 MVA metalclad oil circuit-breaker units for the control of two incoming transformers, two busbar sectionalisers and a bus coupler, and type VTRP.32 units controlling six 400 amp outgoing feeders and one 600 amp interconnector.

Each switchboard is in two sections, erected in separate brick switch houses, and, to gain an impression of the approximate size of a board, each section has the following approximate dimensions: overall height, 16 in.; overall length, 25 ft 6 in.; overall depth, 11 in.

The busbars are of the metal-sheathed condenser type, and of unit construction with compounded joints at tee-off points. To facilitate the periodical testing of bushings, tappings are taken from all breaker bushings, busbars, spout insulators and voltage transformer bushings to centralised power-factor test points located at convenient positions on the gear.

The switchgear is of the duplicate busbar type and busbar selection is effected by the off-load "transfer breaker" method.

The solenoid-operated circuit-breakers are operated from remote-control desks which, together with the vertical pattern relay panels, are located in a separate control room. In addition, provision is made for indication and control of the circuit-breakers over the Electricity Department's supervisory system.

Each incoming transformer breaker is provided with fully automatic reclosing features and intertrips with the corresponding 88 kV breaker at the remote end of the line. On fault and after a specified number of reclosures, both the 20·5 kV and 88 kV breakers are locked out and the 20·5 kV interconnector breaker automatically closes to restore the 88 kV line.

When the lock-out is removed from the incoming 20·5 kV breaker its reclosure is check synchronised automatically and the 20·5 kV interconnector breaker opens within a definite specified time interval. The automatic operations of the incoming breakers, bus sectionalisers and the interconnector are all controlled to conform to a definite sequence as required by the various fault conditions possible on the 88 kV lines, 20·5 kV interconnections and the 88/20·5 kV transformers.

TEN YEARS IN SWITCHGEAR

USUALLY a Tenth Anniversary is not considered an occasion for particular celebration, but in the case of South Wales Switchgear Ltd., progress has been so spectacular as to be deserving of special recognition. Since 1941 it has grown from a firm of 30 employees to 800, requiring a new modern factory at Blackwood which is illustrated. This tenth anniversary coincided with the company's order book passing the million mark, and probably the figure will reach £1½ million in the current year.

At a dinner to celebrate the occasion there was a distinguished top table. Sir Hamish MacLaren proposed the toast of the company, to which Mr. A. J. Nicholas, director and general manager, replied. He mentioned that although five years ago 85% of the company's output went to South Wales, now that figure was only 15% and a large part of the remainder was sold overseas. Only that morning, he said, he had received a confirmatory order from New York for 33 kV switchgear and a 60,000 dollar contract for Cuba. The company has aimed at a high technical standard in their staff and technical education occupied an important place in their policy. Equally significant of the progress of the company is the trend towards heavier equipment. The new 33 kV circuit-breaker has passed its official short-circuit test and should provide a solid foundation for development in the second ten years.

The Blackwood factory of South Wales Switchgear Ltd.

Problems and Practice IN ENGINEERING

Testing Interpole Polarity

RE the article "Testing Interpole Polarity" in the December 20 issue by W. H. This method does not test each individual interpole. From my own experiences I find the following method of testing infallible and can take place without stopping the motor or generator.

Place a small compass near to each pole in turn on the outside of the machine and apply the following formula in case of a motor. The interpole is opposite in sign to the shunt pole ahead in the direction of rotation. In the case of a generator the interpole is the same in sign as the shunt pole ahead in the direction of rotation.—*J. B. Robinson.*

Battery Charging

A DIESEL shunting locomotive was taken out of the repair shops late one afternoon, after undergoing a heavy general repair, and stood in the works yard all night. Repeated attempts to start the engine next morning were without success, owing to the cold conditions and general stiffness in the bearings, and the starter motor batteries were soon completely run down. The locomotive was some considerable distance and inconveniently situated from the nearest possible battery charging point. So the problem of re-charging the batteries was tackled by utilising a portable a.c./d.c. welding set that was working in the vicinity.

The welding set positive and earth return welding leads were coupled, at first through an adjustable resistance, to the 24-volt battery terminals, and the welding regulator set at its minimum range, 25 amps. The welding set was switched on and the resistance gradually reduced until it was completely cut out and the charging current direct from set to battery was 24 amperes. This charging rate was maintained for about an hour, but then dropped as the battery e.m.f. began to rise, and it was then adjusted and maintained at approximately 20 amperes by means of the welding voltage regulator, until the specific gravity of the cells had increased from an initial value of 1160 to 1220 at the end.

During this time the diesel mechanics had been busy adjusting and checking their work, and finally the welding set was disconnected and another attempt made to start, which proved successful after several turns of the engine. Much delay was saved by this extemporisation in battery charging, and after this start the engine was left running for an hour or so to warm up and "run in" the various parts, during which time the batteries were recharged by their own generator and automatic voltage regulator.—*T.H.S.*

Troubles from Hysteresis

WHEN motors exhibit signs of overheating it is natural to suspect excessive current. But this is not always the case, heat can be generated to a dangerous degree by eddy current hysteresis losses. For example, a 1,000 kW rotary convertor melted the solder on the armature bands, which consisted of two double layer steel wire bands, 4½-in. wide. The trouble was attributed to hysteresis owing to the width of the bands and four 2-in. double layer bands were, therefore, substituted. Again the solder was melted. The root of the trouble was not actually in the bands, but in the clips used to hold them. These were made from ⅝-in. broad iron. Following the substitution of phosphor bronze clips, no further trouble has been experienced.

In another case a small foreign-made motor, driving a valve-grinding machine at 3,000 r.p.m., burnt out a few weeks after being installed. It was rewound by a firm of good repute, but a second burn-out soon occured. The armature had tunnel slots, and to give it a fine polished finish the makers had buffed the periphery of the laminae. They were burred over so that the armature had the appearance of a piece of polished solid metal, and a complete electrical path for eddy currents existed through the whole assembly of stampings. In the circumstances the burn-out of the motor was only natural. Application of a file cured the trouble, gap being cut longitudinally along the slots, after which all was well.—*G.V.B.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Redesigned Stock for Southern Region

Changes make Improved Operational Efficiency

RECENTLY completed at Eastleigh, the first of the rebuilt suburban four-car multiple units shows continued progress in design and layout. The main changes from the existing stock lie partially in the electrical equipment, and also in the field of improved operating efficiency. Buckeye automatic couplers have now been fitted to the outer ends of the unit, and these, in conjunction with the re-positioning of the brake hose connections above solebar level, make it possible to uncouple and couple units without going between the coaches at track level.

Improvements within the unit include a redesign of the driver's cab to avoid side doors, access now being through a sliding door from the guard's compartment. The motorman has been provided with an adjustable seat, and his instruments have been grouped into a desk.

Power Control

Each of the two motor coaches in the unit is powered by two axle-hung traction motors, weighing about 1·9 tons each, both motors being carried in the leading bogie as hitherto. The acceleration has been increased to the maximum possible within the limits of adhesion with 25% of the axles motored, and the balancing speed has been raised as far as possible to 63 m.p.h. by field weakening.

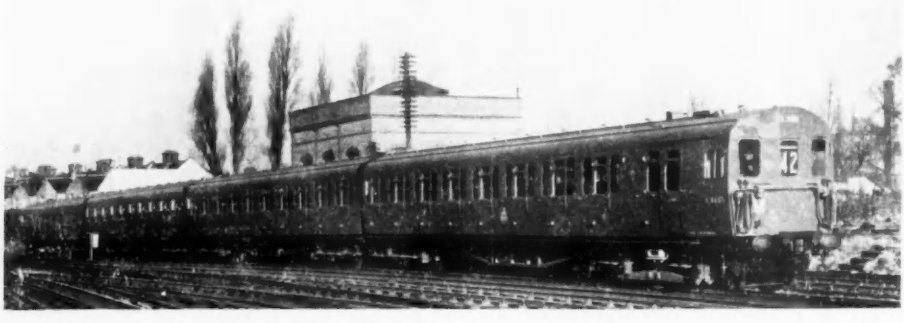
A motor-generator set and battery provides an auxiliary supply at 73 V for lighting, control and the additional Westinghouse electro-pneumatic brake system.

Only four power notches are provided: shunting, full series-full field, full parallel-full field, and full parallel-weak field. Automatic acceleration is provided on both series and parallel notches, and a no-current relay returns the control equipment to the shunting position in the event of a rail supply failure.

A power bus line and a 27-core control line are carried through the train, being connected between the vehicles by two jumpers with plug-and-socket connections.

The stock has been designed and built under the direction of Mr. R. A. Riddles, of the Railway Executive, was constructed by the Carriage and Wagon Engineer at Eastleigh, and the electrical equipment was manufactured and erected in the stock by the English Electric Co.

Top right: The driver's cab has been redesigned
Below: A standard four-car train seen after rebuilding shows absence of driver's doors



17 JANUARY, 1952

LONDON'S LATEST SHOWROOMS

FULL scope for the display of colour lighting is given in the new showrooms of Thorn Electrical Industries Ltd., which were opened at 233 Shaftesbury Avenue, London W.C.2, on Monday last. These are, in fact, an excellent example of the efficient utilisation of a relatively small area—about 1,200 sq ft—without any suggestion of overcrowding. Apart from a sumptuous television theatre, much of the equipment is either wall or ceiling mounted, or concealed, it is true, but the arrangement has been so neatly planned that a wide variety of lighting devices and other equipment can be readily demonstrated.

In plan, the showrooms comprise a central area bordered on two sides by a platform 2 ft high which serves to segregate the different sections without breaking up the showroom by partitions. The window area itself is separated from the showroom by drape curtains, and on an adjacent platform are incandescent lighting display panels, including lamps and fittings, illuminated from above by 80 W batten units. In this area too is an example of the George Forrest range of candelabra fittings. Close by is the domestic section, arranged as living room and kitchen, wherein the demonstration of any home lighting unit can be quickly effected with the aid of a neat little device.

Over the rear platform is one of the most effective methods of demonstrating a large range of fluorescent fittings yet devised. Some 26 Atlas fittings are concealed between a series of ceiling baffles, and at a touch of a switch any one of these units slides into view beneath the baffles, lighting up automatically as it does so. This display can be controlled either from the main switchboard in the central area, or from a secondary board on the platform. The background to this section is an oyster silk drape, and beneath a platform and focused on the drape are 4-colour stage lighting units controlled from an automatic dimming and colour mixing panel.

At the far end are exhibits from the range of double-life lamps, control gear, a colour comparator, and a display of fluorescent paints activated by a new u.v. fluorescent lamp. The ceiling above the central area is illuminated by concealed coloured fluorescent lamps.

The Ferguson demonstration theatre downstairs is arranged to provide the ideal atmosphere in which to assess the performance of radio and television receivers, and includes a miniature theatre stage, the lighting of which is operated from a manual dimmer and colour mixing unit.

In order, top to bottom, is shown the exterior, the Ferguson demonstration theatre, a general view of the lighting showroom and the "lounge" in the home section with the incandescent feature nearby

Power for the Press

Applications of Electricity in Newspaper Printing

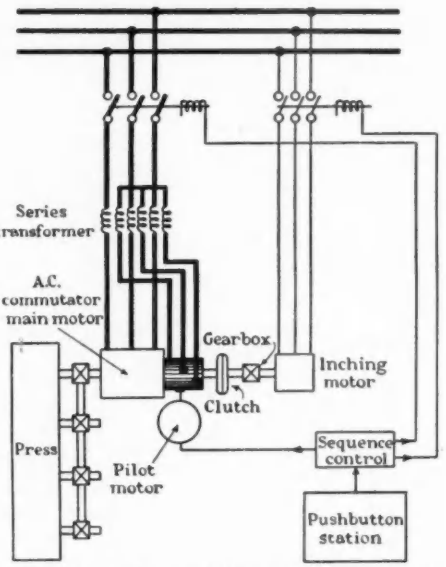
APPLICATIONS of electricity to newspaper production was the subject of the paper selected for the January ordinary meeting of the Institution of Electrical Engineers. The author was Mr. A. T. ROBERTSON, M.I.E.E. (A. Reyrolle and Co.), and he introduced his paper with a general review of the processes involved in the printing of a typical newspaper, and with an analysis of the general characteristics of the resultant electrical load. He then went on to discuss press drives.

Modern Presses

Modern newspaper presses are usually arranged with a number of similar rotary printing units in line, with folders interspersed at intervals. Common shafts run the full length of the presses with clutch couplings between the units. Group drives or individual motors for each component are possible, but there are many advantages in terms of space and economy in favour of the latter arrangement. Required performance is that the press shall be capable of inching and of crawling at low speed (say 2% of full printing speed). The driving equipment must be capable of accelerating the press smoothly between crawling and any desired speed, and of driving it smoothly down to about half full speed. Further, brakes must be fitted to save time in bringing the press to rest during normal printing operations.

The required operating performance can be obtained by the use of variable speed d.c. motors either with or without a geared inching motor, but most driving equipments now in use have motors for inching and crawling in addition to the main driving motors. The inching motors drive the press through a speed-reduction gear and a clutch, and by this means, using only a small motor, ample torque can be provided to start the press and any desired uniform low speed can be obtained for crawling. The clutch allows the main motor to accelerate the press above crawling speed without over-speeding the inching-motor. Such equipments are usually referred to as "duplex." Certain single-motor drives are in use, in which the main motor is used for inching and crawling speeds.

With an a.c. supply, efficient control over the printing range can be obtained either by the use of variable-speed commutator motors, or by rectification and d.c. motors. The design, construction and performance of a.c. motors, the author said, has improved to such an extent that they are now at least as good as d.c. motors. Capital and running cost of rectification to constant voltage with d.c. motors is more than for a.c. motors, and should be



Arrangement of controls for an a.c. series commutator motor drive with a separate squirrel cage motor for inching and crawling

considered only when an existing d.c. drive and control switchgear are to be changed over to a.c. supply. If a completely new equipment is required, and a variable voltage rectifier is used to control a number of motors, as in a unit drive, there is not much difference in cost between this and a scheme using commutator motors. The latter, however, is less complicated and takes up less space than the electronic or magnetic amplifier-controlled rectifier for the d.c. motors.

In the author's opinion the series type a.c. commutator motor is the best for most press drives. In addition to its simple construction, it has the outstanding feature of automatically sharing the load with any paralleled motors

without need for ancillary equipment. If a separate low-voltage low-frequency supply is available, inching motors may be eliminated. Inching equipment can also be eliminated with Schrage motors, if they are large enough to give the full speed range.

With d.c. motors and grid-controlled rectifiers inching motors may again be omitted, but many engineers prefer to retain them, because reliability is of prime importance. Developments in the servo-control of rectifiers has made it possible to obtain satisfactory inching and crawling with single motor drives.

Control panels for presses are usually situated some distance from the press, and provided with push buttons for operation. Because of the method of working employed, widespread provision for locking-out under the operator's control is necessary.

Metal Heating

The plates from which the paper is printed are cast from a pot of molten metal, and to heat this, electrical methods are sometimes used, immersion heaters inside the pot taking the place of gas or oil burners underneath it. This arrangement permits the complete lagging of the pot. Each plate requires 100 lb of metal, and the maximum casting speed is four plates/minute. To melt the necessary 400 lb and raise its temperature to 600° F requires about 275 kW, while a constant radiation loss during casting of 15 kW must also be added.

Cables in the foundry and in the press-room are subject to mechanical damage and to damage caused by oil and heat. For mechanical protection, cables may be either flexible and wire armoured, or run in conduit. It is necessary to exclude oil and ink from rubber insulated cables, but this is not important for p.v.c. or cambric insulated cables. Mineral insulated metal sheathed cable is also specially suitable for use in these circumstances.

DISCUSSION

MR. J. F. SHIPLEY (Mackness and Shipley), who opened the discussion, said that he had not been in any town in any part of the world during the last forty years where the newspaper presses were not electrically driven. He understood that on the Continent the latest principle in braking, especially when a.c. commutator motors were used, was suddenly to take back the brush position to the neutral, when the motor acted as a regenerative machine and rapidly braked the press without any trouble.

MR. P. BINGLEY (Hackbridge and Hewittic), said that the ignitron had two main advantages. Being a single unit, it could be used in certain circuits which were barred to multi-anode valves, and it was more easily stored and replaced. The advantages gained from the reduced space made available by water cooling were offset, however, by the necessity for a supply of water at the correct pressure and temperature. It seemed a step backwards to reintroduce water cooling unless considerations of space made it necessary.

MR. G. P. GARBETT (*Daily Herald*), pointed out that dependability was of supreme importance, and simplicity was another essential requirement. The switchgear, which was the factor which gave rise to difficulties, was designed by an expert but had to be looked after by a maintenance electrician, working against time.

MR. R. KINCH (*Daily Express*), speaking as a practical man engaged in the newspaper industry, said he was interested in how long it would take to clear the average fault on electronic equipment. Almost any fault occurring on the d.c. panel could be cleared in a matter of minutes. He had seen an electronic drive at work, and from the point of view of smooth acceleration and an absence of big current surges, it seemed to be better than any d.c. control.

MR. P. R. GRAY (B.T.H.) suggested that the series a.c. commutator motor had advantages for unit drive complication, but for single motor drives the advantages of the Schrage type seemed to merit attention, while the d.c. motor scheme with rectifier appeared to combine the advantages of the a.c. series commutator motor and the Schrage type.

MR. W. S. NEWTON (*Daily Express*) said his own organisation used both d.c. and a.c., but he did not think that they were satisfied with their a.c. drive, and in his view d.c. drive for press work was the best obtainable.

MR. H. TAYLOR emphasised the importance of not placing electrical equipment in virtually inaccessible positions on the press, so that maintenance became almost impossible. If motors had to be mounted in these positions, he said, it was a strong point in favour of electronic control with d.c. motors, needing little maintenance.

MR. J. RUSSELL TAYLOR (Igranic Electric) pointed out that the presses in use today had been designed before the war, when the number of pages varied considerably. It was not so much the difficulty of control as the complication to which this led which made large control boards necessary.

MR. NILS HAGLOV said that the company with which he was associated started developing the wide-speed-range commutator motor fifteen years ago and had found them very successful. The troubles which they had experienced had arisen from too complicated control schemes, too many relays, and too many contacts. He could not see that any advantage would be gained from the application of electronics.

THE AUTHOR, in reply, agreed that simplicity was fundamental, and said that that was why he thought that at the present stage of electronic development there was nothing to be said for it as compared with the straight commutator motor.

Progress in Production during 1951

A. REYROLLE & CO. LTD.

A. REYROLLE AND CO. again report a busy year with expansion of business in both home and overseas markets. The output of very-high-voltage equipment reached a record, and an extension of "belt-line" assembly methods for some of the smaller ranges of switchgear enabled the great demand for these standard products to be met.

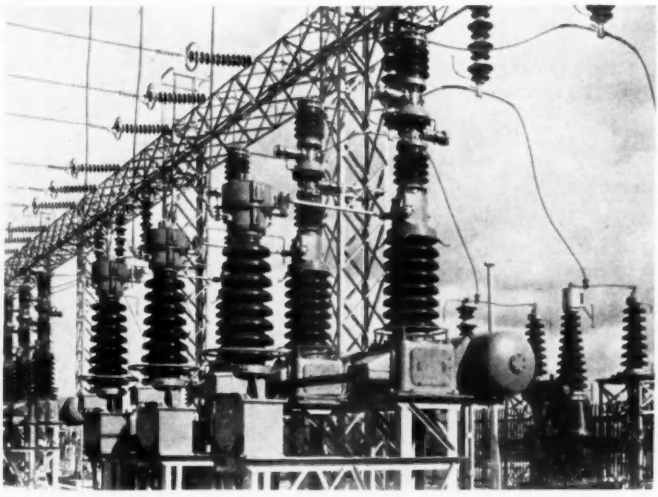
The steady development of switchgear for higher voltages, together with the demand for greater breaking-capacities, also calls for increasing test facilities. In addition, therefore, to completing important extensions in the high-voltage laboratory of both the impulse-test equipment and the 50-cycle test-transformers, good progress was also made on buildings for the new short-circuit testing station.

High-Tension Switchgear

Received during the year were orders for 275 kV 7,500 MVA air-blast circuit-breakers. An installation of outdoor air-blast switchgear rated at 132 kV and 2,500 MVA at Poole power station was completed, and good progress was also made with similar installations for a power station in Lincolnshire and a divisional transforming station in south-east England. Erection of the first 132 kV, 3,500 MVA indoor air-blast circuit-breakers was begun for a power station in the London area.

The ever-increasing world-wide demand for open-type small-oil-volume circuit-breakers for voltages from 33 kV to 220 kV is a tribute to the popularity of this equipment. In addition to many outdoor installations supplied for service in Britain, contracts received included 132 kV equipments for Spain, South Africa and South America, and a 220 kV installation for Australia. Extensions were ordered for a 132 kV open-type indoor installation now nearing completion in south-west Scotland,

Part of 18-panel 33 kV 1,000 MVA metal-clad horizontal draw-out switchboard with solenoid-operated oil-break circuit-breakers supplied to Queensland, Australia



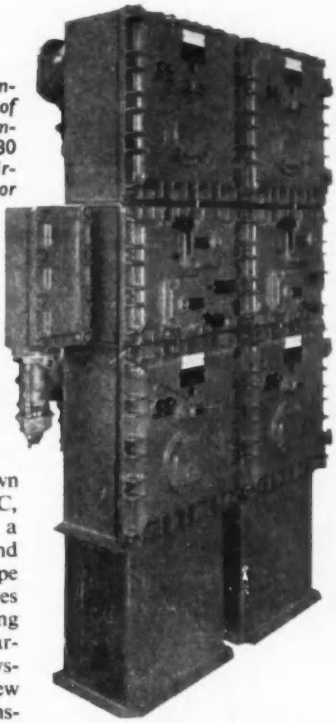
132 kV 3,500 MVA air-blast circuit-breaker with four breaks per phase

and 33 kV equipment for a somewhat similar indoor layout for Victoria power station, Belfast, was put in hand.

The demand for economical 500 MVA and 750 MVA 33 kV outdoor circuit-breakers continues to increase, and, in addition to numerous installations at home, equipment has been supplied to many overseas customers,

particularly in Australia, India, Canada, Spain, Hong Kong, and Venezuela.

Orders for standard ranges of horizontal-draw-out and vertically isolated metal-clad oil-break switchgear for voltages up to 33 kV for power station, substation, and industrial use, kept the resources of the factory fully employed. The demand for this type of switchgear for industrial use showed a general increase, and included orders for new installations and extension of plant at cement works, chemical plants, steel works, and oil refineries, to name but a few. Equipment for the complete reorganisation of the distribution system of a large aeroplane works was also ordered.



Typical medium-voltage flameproof switchboard comprising four 80 amp contactor circuits for motor starting, as developed for oil-refinery service

Air-break Switchgear

Considerable service-experience was obtained with 33 kV and 415 V air-break switchgear, and additional orders were received for equipment of this type. Air-break circuit-breakers are ideal for controlling auxiliary supplies in power stations, as experience has fully confirmed.

Among the orders in hand for flameproof switchgear was a contract for a complete installation at an oil refinery in Kent. New items introduced for mines included a type GA7 bell-signalling transformer and an improved system of multi-motor conveyor-control with time-delay starting, changeover to individual control, and protection for each motor.

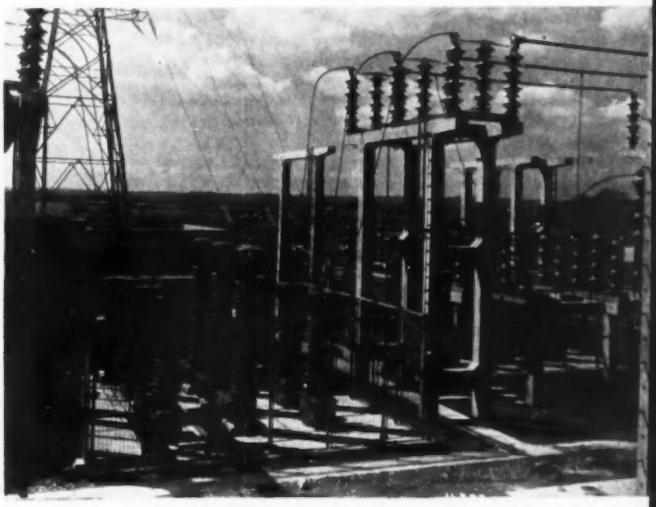
Other development work resulted in the introduction of a new system of pilot-feeder-protection known as Solkor C, which utilises a transductor and a telephone-type relay, and gives higher operating speeds than earlier Solkor systems. A new system of transformer protection was introduced, known as duo-bias, and this also utilises a transductor and a telephone-type relay. It has already been applied to 100 MVA transformers in Yorkshire.

Protection

With increased switchgear orders the demand for protective equipment continued to expand, and it was found necessary to increase still further the facilities for manufacture of relays and associated components.

Telephase carrier-current protection has been installed and commissioned for several important 132 kV transmission lines in England, and further operating experience of the equipment has been obtained in service with the North of Scotland Hydro-Electric Board. The problem associated with the protection of lines having high load current and low fault current was the subject of further investigation, and has been solved by the use of new starting equipment.

110 kV outdoor switchgear installation in Northern Ireland showing small oil-volume circuit-breaker with associated post-type current transformers in fenced compound



overseas news

Western Australian Progress

Erection of the building to house the third and fourth turbo-alternators, with their boilers at South Fremantle power station, W. Australia, has made good progress, the steel framework being nearly completed, according to a recent statement of Mr. D. Brand, Minister for Electricity. Except for the condensers, the two turbo-alternators and most of the boiler equipment had arrived. Detailing the government's power-increase policy, Mr. Brand said that at Bunbury the site had been selected for a new power station and tenders had been called for the first two 30,000 kW turbo-alternators and boilers. Bunbury station will be connected to the Metropolitan and Southwest systems, he said. Bunbury station will be added to in sections and will ultimately become the main generating station for the Commission. The Southwest power scheme too, is making good progress. High tension transmission mains have been erected from Collie to Bunbury with a northern branch to Waroona and a southern branch approaching Donnybrook. At Albany the Commission has installed two additional 600 h.p. diesel units and called tenders for a third. A h.t. main connects Mt. Barker to Albany and this town's supply has now been converted to 50 cycles a.c. To date 7,000 to 8,000 houses have been changed from 40 to 50 cycles.

No Cuts

Despite the growing shortage of loan funds, hydro-electric construction works in Tasmania and housing programmes of the State Government will not be interrupted, the Premier, Mr. Cosgrove, has declared. He intimated that the Cabinet had had a full discussion about adjustments necessary to State public works projects to be financed from loan funds. It has been decided that the Hydro-Electric Commission's undertakings and the Agricultural Bank's home building programme should be given first priority, he added. Sufficient funds will be made available to enable the Commission to carry on its operations as planned.

The Coal Question

The State Electricity Commission of Western Australia and the State Railway Department are concerned about whether sufficient coal will be available shortly for their requirements. There is no immediate anxiety, because the State Electricity Commission has a stock-pile of about 17,000 tons. The Railway Department's stock-pile is also about 14,000 tons. But the position is expected to remain rather "tight" up to about Easter, we understand.

Tasmania Works

Installation of the sixth 21,000 horse-power generating set and associated pipeline at Tarraleah power station has been completed, Mr. A. W. Knight, the Hydro-Electric Commissioner, Tasmania, announced recently. The unit has been tested and is now available for operation, he added. In regard to the Tungatinah power station, he earlier stated that construction of the concrete sub-structure was well advanced, and preparations were being made for the erection of the steel structure now on order in England. He understood that satisfactory progress was being made with the manufacture of the 175,000 h.p. generating plant for the power station, and the first two main transformers were now in transit. Parts of the 35,000 h.p. turbines were also on the way. Incidentally, the Commission has just received some 3,200 tons of steel from Japan, and at the same time has learned that the British Government has agreed to the release of 500 tons of the 1,750 tons of steel plates on order in England for the Tungatinah station pipelines.

Canadian H.E. Development

Hydro-electric construction in Canada continued to maintain a high level during 1951 with 881,250 h.p. of new capacity put into operation, it is shown in the year end summary of Mr. R. H. Winters, Minister of Resources and Development, Ottawa. Allowing for the dismantling of several old plants, the total installed hydro-electric capacity in Canada is now listed at 13,340,774 h.p.—approximately 24% of known resources. New plants and extensions planned to be in operation in 1952-53 total more than 1,700,000 h.p. and about the same amount is under preliminary construction or planned to be in use in 1954-55. With the additional plant, electricity generated last year was approximately 13% above the 1950 figure. In Quebec in particular construction of hydro-electric plants has been accelerated; and last year a total of 461,700 h.p. was brought into operation. Installations in Ontario we have already noted; the Hydro-Electric Power Commission also completed nearly 200 miles of 230 kV transmission line. In British Columbia, work has started on the Nechako-Kitimat development for the Aluminium Co. of Canada. For this, present plans are for an installation of 420,000 h.p. of plant, but the tunnel and transmission line capacity are designed for a total installation of about one million h.p.

Alberta Expansion

Calgary Power Ltd., plans to spend $50,000,000 in Alberta for power development by way of new plants, lines and equipment in the next five years to keep pace with the growing demand for electric energy from the new and expanding industries, rural electrification and domestic and business customers, it has been announced. The company has spent $25,000,000 on an expansion programme during the past three years but has only just managed to keep abreast of the growing demand. Several projects are under review at present but a definite decision has not yet been reached on which plants will be given priority when the five-year plans get under way. Both hydro-power and steam-power plants in Southern and Northern Alberta are under consideration, we learn.

Quebec's Plan

Despite big increases in installed hydro-electric power capacity in Quebec, it seems that further large projects will be needed fairly shortly. Speaking in New York recently, Mr. J. A. Fuller, president of Shawinigan Water and Power Co., said if the present rate of load growth on the company's system continues, 160,000 additional horsepower each year will be needed. The company's load growth, he added, had been double pre-war rates, and is now running at over 10% annually. Mr. Fuller foresaw a tight situation in the latter part of 1953 and a real need for additional power by a year later. The company may have to start on its next big power development at Rapide Sans Nom (capacity 290,000 h.p.) next spring to have it operating in late 1954; but there had been no final decision to go ahead, he said.

Production in Italy

The Italian National Association of Electro-technical Industries has announced that the value of output in this industry has risen from 2 milliard lire in 1938 to 160 milliard in 1950 (i.e. 80 times as against a 54-fold inflation). Similarly, employment has risen from 30,000 workmen and 10,000 technicians in 1938 to 79,000 workmen and 21,000 technicians in 1950. Exports in 1950 were valued at 25 milliard lire whereas imports amounted only to 8·6 milliard lire, about 4½% of the national production. With 24,000 metric tons of copper for the last quarter of 1951, no great anxiety is yet expected in that direction. On the other hand, the price of copper is causing some concern, and the domestic market for electro-technical products is weakening owing to the slowing down in the construction of new power stations, the lack of enlargement of telephone exchanges and the shortage of available capital at low rates of interest.

Indian Discussions

There have been discussions in Delhi in recent weeks between various authorities and a delegation from the Federation of Electricity Undertakings of India. Problems dealt with covered such ground as amendments necessary to the Electricity (Supply) Act and the Government's policy regarding electric development in the private sector.

Trade Envoys

Evidence of many countries' efforts to capture the valuable Indian market is clearly shown at the International Industrial Fair which opened in Bombay last Thursday. Exhibits of manufactures from China, Hungary and Czechoslovakia include electrical goods, drilling machines and similar technical equipment. Russia also has an exhibit, with television sets on view, although as yet there is no television transmission in India.

Congo Electrification

The Congo Government is going ahead with plans for the construction of a large hydro-electric power dam and reservoir on the great Matamba River Falls, near Matadi, as a first electrification project for the Western Lower Congo Region within the framework of the Ten-Year Development Plan. Total installed capacity is expected ultimately to reach 30,000 kW. A special committee appointed by the Belgian Ministry of Colonies in Brussels has completed plans calling for the installation of productive capacity of about 1,000,000 kW for use by mechanical and chemical manufacturing industries. In Ruanda-Urundi, which is a mandated territory, plans are in hand for the utilisation of the waters of the Ruzizi River, which is stated to be capable of producing up to the equivalent of 600,000 h.p. At present, power utilisation in the mandated territory is only about 2,000 h.p. and is quite inadequate. There are several points on the river which might be used for hydro power production. The Kirimba Falls is suggested as a suitable site for a large power house. Cost of installations has been estimated at 350 million Belgian francs, with an additional 300 million francs needed for transmission lines and other auxiliaries.

Kenya Development

In connection with further hydro-electric development in Western Kenya, survey is either in progress or contemplated in the immediate future, Mr. J. L. Bernhardi, Nakuru area representative of the East African Power and Lighting Co. recently told local officers. At a meeting of the district council, he also mentioned investigations on the part of the company into a possible hydro-electric scheme in the Mandi area. He also agreed to ascertain if the Enarasura and Maisita rivers had been surveyed for hydro-electric potential. Referring to the company's new thermal station at Mereroni, five miles from Nakuru, one set was in operation, another had arrived and a third was in transit, he explained. The three sets would have a total capacity of 2,050 kW. Because of its position, the Mereroni station will be capable of further extension to meet all the requirements of Nakuru and the rural areas for some considerable time to come, he said, adding that the supply from the proposed Thomson's Falls hydro-electric scheme would augment the Mereroni supply still further.

PERSONALITIES

IN THE INDUSTRY

Station superintendent at Poole generating station, Southern Division, B.E.A., **Mr. L. E. Brickwell** is to relinquish that post at the end of February, to take up an appointment as chief engineer to International Combustion Australia Ltd., we learn. He will probably fly out to Australia towards the middle of this year, we understand. Prior to taking up his present position about 18 months ago, Mr. Brickwell was station superintendent at Earley, where he went in September 1944 as deputy superintendent. He originally started with the Stirling Boiler Co. Ltd., in 1929, and became efficiency engineer at Havle power station, Cornwall, in 1942, subsequently holding a similar position at Little Barford until going to Earley.

Mr. L. E. Brickwell

Due to arrive in England today, January 17, by air is **Mr. A. H. Benjamin,** chief electrical engineer to the Hydro-Electric Commission of Tasmania. He is to confer with British manufacturers on the supply and delivery of generating plant and equipment for various power stations under construction in Tasmania. He is flying here via Canada (where he has inspected plant on order for the Commission), and it is expected that he will remain in this country for several weeks.

Mr. A. C. Jones has now succeeded **Mr. W. L. Richards** as manager of the Bristol branch of the General Electric Co. Ltd. Mr. Jones was educated at Monmouth Grammar School and Manchester University. He joined the company in 1921 at the G.E.C. Cardiff branch, and served in all departments before transferring to the firm's Bristol branch in 1923. He has since had charge of each department there in turn. Mr. Richards, who retired at the end of last year has served for a record period as a G.E.C. branch manager, having originally been appointed manager of the Bristol branch in May, 1912. He started with the company at the Cardiff branch in 1910 as general representative for the West of England.

Mr. W. L. Richards

Mr. A. C. Jones

At the end of this month **Mr. A. M. Jacobs,** M.A., is relinquishing the chairmanship of the Electricity Supply Commission of South Africa. He succeeded the late Dr. H. J. van der Bijl in that office in December, 1948. Although retiring, Mr. Jacobs anticipates being connected with electrical development in South Africa for some time yet, we understand.

Mr. John Rae has retired from the chairmanship of McKechnie Brothers Ltd., but is remaining on the board of directors. **Mr. J. D. McKechnie** has been appointed chairman of the company, but is also retaining the position of managing director.

Mr. C. L. Chapman, chief development engineer of Venner Accumulators Ltd., has flown to U.S.A. and Canada for technical discussions with world concessionaires of the silver cell. He will be followed by **Mr. R. P. Mason,** commercial manager of the same company who leaves by air on January 18. Mr. Mason will discuss the commercial aspects of silver zinc accumulators with American colleagues and also with the newly-formed Canadian company, Silvercel (Canada) Ltd.

Associated with companies in the E.M.I. group since 1924, **Mr. F. Grosch** has been appointed personnel manager of Electric and Musical Industries Ltd. He was latterly assistant personnel manager; and has had wide experience of employment problems in the group.

A prominent figure wherever space-warming, ventilation and electrical installation matters are discussed, **Mr. Rorald Grierson,** M.I.E.E., M.I.Mech.E., recently celebrated his 65th birthday and has now retired from his appointment of heating engineer to the Eastern Electricity Board. We understand that he hopes to maintain touch with old friends; his present address being 25 Bucks Avenue, Watford. During the past 16 years he has made a special study of the automatic time and temperature control and thermal

Mr. R. Grierson

efficiency of 16 thermal storage space working installations of the electrode and immersion heater types, installed in Northmet offices and other buildings. He gained early practical training in the municipal power stations at Mansfield, Rochdale and Poplar, after taking a course in electrical and mechanical engineering at the University of Birmingham. Later he did some pioneering work relating to electrical and mechanical equipment for large theatres and film studios, including work in association with Commander Haydn T. Harrison on projection arcs. Following war service he was managing director of Grierson Ltd. from 1922 to 1936, during which time he was responsible for many important electrical installations. Also in association with Richard Crittall and Co., he was responsible for a number of electric thermal storage installations. Mr. Grierson was chairman of the I.E.E. Installations Section in 1942-43, is a past-member of the Councils of the I.E.E., E.D.A. and I.H. and V.E., apart from serving on numerous committees. He is also the author of many technical papers and books.

Mr. F. G. Manning, B.Sc., has retired from the Ministry of Supply, where until recently he held the post of director general i/c of Aircraft Production and Aeronautical Inspection, to take up an appointment as joint managing director of Tenaplas, Ltd., the plastics extrusion company whose works are situated at Upper Basildon.

For the second year in succession, **Mr. E. C. Holroyde,** chairman of Crompton Parkinson Ltd., has been appointed chairman of the Cable Makers Association. Of the C.M.A.'s affiliated associations, **Mr. W. E. Hind,** senior association officer, British Insulated Callender's Cables Ltd., becomes chairman of the Mains Cable Manufacturers' Association and the Mains Cable Manufacturers' Association (Super Tension); **Mr. J. S. A. Bunting,** M.C., director and general manager, cables, of Edison Swan Electric Co. Ltd., is now chairman of the Rubber and Thermoplastic Cable Manufacturers' Association, and **Mr. E. S. W. Worsdell,** British Insulated Callender's Cables Ltd., has been elected chairman of the Overseas Rubber Cable Manufacturers' Association. All these appointments are for the year 1952.

The Benjamin Electric Ltd. announce the appointment of **Mr. Denis R. Crow,** A.M.I.E.E., as assistant general sales manager to **Mr. A. E. Iliffe,** director and general sales manager. Mr. Crow entered the electrical industry with the General Electric Co. in 1932, gaining experience in various departments while continuing his studies at the Polytechnic Institute. During the war he served with the Royal Corps of Signals, being demobilised with the rank of captain, to rejoin the G.E.C. He went to Benjamin Electric Ltd. in 1947, and in 1948 was appointed sales manager of the Fluorescent Department. He will now be interested in all sales activities of the company, both home and export

Mr. D. R. Crow

It is announced that **Sir John Woods,** G.C.B., M.V.O., has been appointed a director of the English Electric Co. Ltd., and Marconi's Wireless Telegraph Co. Ltd.

Lord Inverforth, who became president of Cable and Wireless (Holding), Ltd., in 1929, has asked to be relieved of his active responsibilities as president and director of all the group companies. He has agreed to become honorary president. **Sir Harry Twyford,** who joined the board in 1942, has resigned because he now lives in Devon, and **Lt.-Col. Ivor Fraser** has also asked to be relieved of his active responsibilities for health reasons. Both have accepted appointment as honorary vice-presidents. **Mr. Alastair Forbes Roger, Mr. S. Harold Gillett,** and **Lt.-Col. Anthony D. Balden** have been appointed directors of the company.

Mr. Ernest F. Schofield, A.M.I.E.E., A.M.I.I.A., has been appointed to the position of sub-area engineer in the Glasgow sub-area of the South West Scotland Electricity Board, where he had previously been deputy sub-area engineer. Mr. Schofield commenced in the electricity supply industry in Harrogate and later held appointments at Blackburn and Luton.

Mr. E. C. Holroyde

Mr. W. E. Hind

Mr. J. S. A. Bunting

Mr. E. S. W. Worsdell

Managing director of the Telegraph Construction and Maintenance Co., Ltd., **Mr. J. N. Dean,** B.SC., A.R.I.C., F.I.R.I., left London by air last Friday to visit Telcon's gutta percha plantation in Malaya. This 3,500-acre estate was acquired in 1915 by the Selborne Plantation Co. Ltd., which was specially formed by Telcon for the purpose, and large quantities of the material are used annually in the manufacture of submarine cable at Greenwich. Mr. Dean, who expects to be away for about a month, will also visit Pakistan where Telcon has recently established jointly with International Industries Ltd., of Karachi, a company called Telcon (Pakistan) Ltd., to further Telcon's cable interests in that country.

Mr. J. N. Dean

Mr. G. T. Jones, for several years a director and secretary of Permaheat Ltd., the well-known manufacturers of electric blankets, has now severed all connections with that firm, and has formed a company for the manufacture of electrically-heated rayon sheets. The name of the new company is Somnolux Electrical Products, and they have taken over new premises at Heyes Lane, Alderley Edge, Cheshire. Mr. Jones has had considerable experience in the production of electrically-heated domestic and medical products, and was a member of the sub-committee appointed by the recent conference of electric blanket manufacturers. He was also one of the sub-committee appointed by the B.S.I. in 1950 to prepare standards for electrically heated pads and blankets.

Severing his connections with Zirconal Ltd., with whom he was a director for 4 years, **Mr. F. George** has now joined Refractory Mouldings and Castings Ltd.

From Hoover, Ltd., we learn that a new branch, called the South London, has been formed, comprising the existing Westminster, Lewisham, Streatham, Sutton and Kingston districts. **Mr. P. Durston,** former manager, South East branch, is manager of this new branch. The company also announce the following other new appointments: South East branch, **Mr. C. F. Needham,** is now branch manager; Midland branch, **Mr. W. Findlay,** former district manager, Glasgow north, appointed branch manager; Hendon district, **Mr. P. A. B. Whiteman,** sales promotion department, Perivale, appointed district manager; Norwich district, **Mr. S. F. Alsworth,** supervisor, Streatham district, appointed district manager; Portsmouth district, **Mr. T. H. Brown,** supervisor Romford district, appointed district manager; and at Glasgow north district, **Mr. A. Hutchinson,** supervisor, Edinburgh district, is now district manager. In addition, **Mr. T. G. Davidson** has been appointed dealer relations manager, and will operate under the control of Mr. A. W. Bunn.

It was announced on Monday that the Royal Commission on Awards to Inventors has recommended that **Sir Robert Watson-Watt** and 20 other claimants should receive a total of £94,600 for their efforts in regard to the invention and development of radar. Sir Robert himself is to receive £50,000.

With effect from January 1, **Mr. K. R. Green** has been appointed sales manager, scientific and industrial products, of Sunvic Controls Ltd. Educated at Westminster City School and the Borough Polytechnic, Mr. Green commenced his early training with W. T. Henley's Telegraph Works Co. Ltd., and entered the field of scientific and industrial instrumentation when he joined the Cambridge Instrument Co. in 1934, later going to the Marconi-Ekco Instrument Co. soon after its formation. During, and after the war, he was superintendent of the Engineering Division of Parkinson and Cowan Ltd. He joined Sunvic Controls Ltd. early in 1951 as an application engineer.

Mr. R. Titterington, chief clerk at the Skipton district office of the Yorkshire Electricity Board since 1948, has been appointed senior assistant (admin.) at the head office of No. 1 sub-area (Bradford) of the board.

Dame Caroline Haslett, D.B.E., J.P., has recently returned from a visit to Italy made in her capacity as President of the International Federation of Business and Professional Women. In her busy fortnight's tour which covered Milan, Rome, Sorrento, Naples and Florence, Dame Caroline's main purpose was to consult with Italian business and professional women, but she also visited electrical engineering works in North Italy and met leading men in the industry.

Winner of the 1951 Ekco window Display Competition, **Mr. E. G. Watson,** managing director of Geo. Watson (Electrical) Ltd., was recently presented with a cheque for £100 by **Mr. G. W. Golfrey,** general radio sales manager of E. K. Cole, Ltd.

Mr. Watson, left, receiving his cheque

Col. W. J. Kent, C.B.E., D.L., on whom the honour of Knight Bachelor was conferred in the New Year Honours list, is well known in the electrical industry as chairman of Taylor, Tunnicliff (Electrical Industries), Ltd., the holding company controlling a group of subsidiaries engaged in the manufacture of electrical insulators, special porcelains and high-voltage o.h. line equipment. Col. Kent has led a life of distinguished service, not only in the electrical industry, but also in the public and social life of Staffordshire. He practised with his father as a solicitor until 1914, and after war service joined Taylor, Tunnicliff and Co., Ltd. In the last war he was A.R.P. controller for the county. He is at present a member of the Electricity Consultative Council for the Midlands, and has been president of the British Pottery Manufacturers' Federation, chairman of the National Council of the Pottery Industry, member of the Electrical Advisory Council of the B.I.F. and high sheriff of Staffordshire (1943).

Col. W. J. Kent

Mr. J. H. Bramley, who joined the Lancaster electricity undertaking from Lincoln over 20 years ago, has retired. He was deputy city electrical engineer there for about 20 years. On the retirement of Mr. G. C. Milnes and the vesting of the undertaking in the B.E.A., he became chief engineer and manager and subsequently transferred to the North Western generating division of the B.E.A. as senior assistant engineer of No. 1 sub-division. On his retirement he has been presented with a radio set by his colleagues.

OBITUARY

Mr. J. W. Hadfield, who was borough electrical engineer at Barnstaple for 35 years, retiring in 1937, died recently, aged 79.

Mr. Price F. White, for 41 years borough electrical engineer to Bangor Corporation, died on January 10, aged 78. He retired in 1940. Mr. White started at Bangor in 1899, going there after seven years in the Electric Light and Power Dept. of the G.P.O. in London. He was a member of the I.M.E.A. Council in 1933/36 and 1938/9, and was chairman of the Bulk Supply Committee of the I.M.E.A. in 1935/36. He was also one of the two members of the I.M.E.A. Council selected to submit the views of the Association on proposals for the reorganisation of the supply industry to the McGowan committee. Mr. White was one of the founders of the North Wales and South Cheshire Local Authorities Electricity Undertakings' Association, being secretary for many years. He acted as consulting engineer to numerous local authorities in North Wales, and was responsible for the preparation and carrying out of electricity schemes for local authorities.

Mr. W. H. Taylor, M.I.E.E., lately with Johnson and Phillips Ltd., died on January 1, aged 77. He joined the contracts staff of J. and P. in 1908 and subsequently became assistant contracts manager, with special responsibility for the company's business in the North West and Midland areas. In this capacity he was responsible for the erection of numerous sections of C.E.B. grid lines and for many colliery electrification schemes. Mr. Taylor officially retired in 1939, but continued to serve the company in an advisory capacity right up till the time of his death.

Mr. H. K. Patterson, formerly a director and manager of the Birmingham office of the Wailes-Dove Bitumastic Co. Ltd., died on January 11, aged 73.

Mr. P. E. Higgin, director and northern agent of the Walsall Electrical Co., Ltd., died on December 23, aged 71. Formerly with the G.E.C. and Pirelli Cables, he joined the Walsall Electrical Co. in 1927 and became a director in 1933. The agency arrangements are being carried on by his son, Mr. R. L. Higgin, A.M.I.E.E.

Mr. P. Willis, J.P., who retired in January 1950, from the post of works superintendent in the Blackpool Corporation Transport Department, died on January 8, aged 67.

Sir Thomas Bell, K.B.E., late managing director of John Brown and Co. Ltd., Clydebank, died on January 9, aged 86.

Mr. Sidney Z. Hall, late managing director of the Hamworthy Engineering Co. Ltd., died on January 8.

The funeral of **Mr. W. G. Swain,** late director of Lancashire Dynamo Holdings and managing director of Crypto Ltd., took place at Park Lane Methodist Church, Wembley, on Thursday last, when over 300 people were present. Those who attended included many representatives from the Crypto staff and other colleagues and a number of directors of associated companies. It is deeply regretted that in our obituary notice of Mr. Swain last week we reproduced a wrong illustration—the correct photograph of Mr. Swain is shown alongside. Our sincere apologies are also due to Mr. W. Szwander, Dipl.Eng., A.M.I.Mech.E., M.I.E.E., chief technical assistant with Belfast Corporation Electricity Department, whose portrait was wrongly inserted last week.

Mr. W. G. Swain

NEW LITERATURE

Alternating-current Machinery

by B. F. Bailey and J. S. Gault

TEXTBOOKS on a.c. machinery at graduate standard are many, but this work, by two professors of the University of Michigan, is one of the best American examples that has come the reviewer's way. It explicitly avoids complicated design formulae and details and advanced mathematics, but discusses at some length the fundamentals of transformers, synchronous and induction machines. These subjects are presented in a way most helpful to a student fresh to the detailed study of machines, and there is a welcome leavening of practical constructional information. This latter feature is helped by the well chosen, if scarce, illustrations. Most of the subjects usual to such a volume are dealt with; additional matters discussed are small single-phase motors, selsyn devices, rotating magnetic field theory, and currents in rotor bars. Published by McGraw-Hill, 421 pages, 9 in. by 6 in. Price 51s.

Manual on Large Scale Project Diffusers

by H. Zijl

IN its early part highly mathematical, but concluding with chapters on practical applications, this volume provides a compact survey of the problems of light distribution for diffuse emitters of both finite and infinite dimensions. Such light sources as glass panels illuminated from behind, or arrays of fluorescent lamps, cannot be regarded as point sources, and in consequence the inverse square law cannot be applied. The author tackles the consequent problem from the theoretical angle, and develops a set of formulae which can be applied to solve cases arising in practice. Included in the book is a set of 49 charts from which illumination values produced by diffuse light sources of different types and dimensions can be computed directly, and a set of coefficient-of-utilisation tables. Published by Cleaver Hume Press, Ltd., for Philips Technical Library, 270 pages, 9 in. by 6 in. Price 30s.

Conduction of Electricity Through Gases

by K. G. Emeleus, M.A., Ph.D.

SINCE this useful monograph last appeared in 1936, there have been many advances in the theory of electric discharges. This is reflected in the alterations that have been made by the author for the present edition, and these further take account of the large amount of work which is still being carried out. As with all the Methuen monographs, the aim is to present the science student with a compact statement of the principles of the subject. In the present case, this had been achieved in a manner that makes the book most useful to electrical engineers who require information in this field. A general survey of discharge theory is followed by detailed consideration of initiation, cathode, negative column and positive column phenomena, while there are additional notes on electrodes for exploring discharges. Published by Methuen, 99 pages, 6¼ in. by 4 in. Third edition, price 5s. 6d.

Photoelectric Tube

by A. Sommer, D.Phil., A.M.I.E.E.

PHOTOELECTRICITY is finding increasingly diverse applications nowadays, and this small volume will be welcomed by the engineer who wishes to check on its basic principles. Apart from a chapter dealing with the theories of photoelectric emission, the work is mainly descriptive and non-mathematical. The various common types of photoelectric cathode are described with attention to colour sensitivity, and the problem of matching light sources and photocathodes is discussed. Gas-filled photocells and multiplier photocells are dealt with at some length and a final section lists briefly some important applications of photocells. Published by Methuen, 118 pages, 6¼ in. by 4 in. Second edition, price 8s. 6d.

Practical Mathematics—Volume 1

by L. Toft, M.Sc. *and A. D. D. McKay*, M.A.

THIS is the third edition of a text book that has justifiably established itself as a standard work for the London University degree in engineering. To increase its utility for that purpose, the opportunity offered by the preparation of a new edition has been taken to divide the work into two volumes. That now under review effectively covers the Part I mathematics syllabus of the degree examination, and for this purpose some extensions have been made to the treatment of certain sections. In particular, a new chapter has been added on statistics and correlation. It includes a study of normal and Poisson distributions, and on the cumulative effect of small errors and of the evaluation of correlation. As in previous editions, a full selection of examples is provided. Published by Pitman, 5½ in. by 8½ in. Third edition, price 20s.

BOOKS RECEIVED

The Nature of Polyphase Induction Machines, by P. L. Alger. Analysis of characteristics carried from elementary theory to tensor analysis. Published by Chapman and Hall, 397 pages, 9 in. x 6 in. Price 60s.

The Working of Aluminium in the Shipyard. Practical information. Published by The Aluminium Development Association, 33 Grosvenor Street, London W.1, as Information Bulletin No. 18, 36 pages. 8½ in. by 5½ in. Price 2s.

Office Management. Official report of the 1951 National Conference of the Office Management Association. Published by the Association from 8 Hill Street, London W.1, 53 pages, 9¾ in. by 6 in. Price 7s. 6d.

Modern Power Station Layout

Trends Described at E.P.E.A. Meeting

OWING to the fact that some of the members who are on the operational side of large power stations requested it, the London Local Group of the Electrical Power Engineers' Association arranged for two lectures to be given on Power Station Layout and Commissioning of Power House Plant respectively. The first of these was delivered to a large attendance last Monday by Mr. S. D. Whetman, and the second will be given by Mr. C. W. A. Priest on March 17.

Opening the subject, Mr. Whetman pointed out that the main design trend in this country was the increasing size of the boiler as compared with the turbo-alternator. Unit techniques had led to large combustion chambers, and although at the moment 60 MW was the largest unit system running, 100 MW turbo-alternators and boilers had been designed. One of the advantages of the large boiler was its greater availability.

A second trend was the great advance in instrumentation associated with automatic and remote control. Thirdly, there was a great improvement in maintenance facilities and amenities, and fourth was the introduction of water-treatment plant, coal sampling and the provision that had to be made for the efficiency engineer and his staff and equipment.

Site Considerations

Assuming that the size of machine, boiler output and steam conditions had been laid down, the station layout primarily depended on the site conditions. Cliff Quay, for example, was a station that in the plan view appeared to be back to front. Coal came in from the seaward side and passed over the turbine-room to the boiler-house on the landward side, while electricity generated on the seaward side passed to a switching station behind the station and then returned on the high-voltage lines past the power station and over the estuary. When, however, one looked at the site contours, the reason became clear. If the boilers had been placed on the seaward side, the whole station would have had to have been moved back to obtain good foundations. This in turn would have required heavy excavation into a steep hill immediately behind the power station and much expense. For the same reason—to reduce excavation—the station had been made long and thin.

In Poole, on the other hand, the site was dead-flat with clay under a thick, but varying in depth, layer of silt. The layout had been designed to put the heaviest weight at points where the clay was nearest to the surface, and where the clay was deep down the coal store had been located.

This station had, in fact, been built on a mass concrete foundation, probably one of the largest in the world.

Constructional Work

A point which often did not receive the attention it deserved was the speed of construction. Apart from the outgoing of interest on capital during construction there was also the loss of earning capacity during the same period. Foundations and boilers should be planned for completion with minimum delay and ample facilities should be available on site.

The traditional way of erecting a boiler was to put up the building and then erect the boiler on its own supports within the structure. Modern trends, however, tend to suspend the boiler from the building structure, and this could lead to considerable speeding up after the first unit had been installed.

In the United States, considerable attention was being paid to outdoor or semi-outdoor stations. Many of these were oil or natural gas-fired, and it was probable that they owed their design to oil refinery techniques. One semi-outdoor station was going up in this country at Ince, Cheshire, and in this case the top of the boiler and the furnace were enclosed, the remainder being exposed.

Auxiliaries

It was unfortunate that the large crane, provided in the turbine house, only did its heavy work during construction. It might be better to have two smaller cranes and two loading bays using a beam for the heavy lifts. In America, stators were often erected with temporary gear.

Bunker design also was difficult, both in location and cost. The centre bunker between turbine and boiler house was usually best.

Mr. Whetman showed numerous slides illustrating different layouts and explaining the reasons for them, and concluded by commenting on reheat. Finally he referred briefly to the positioning of control boards and the instrumentation required.

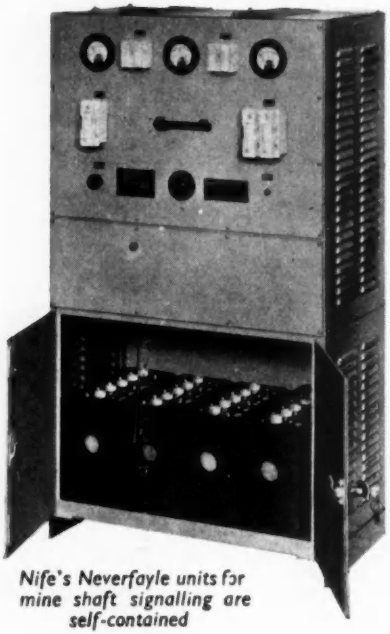
The BUYER'S *Column*

Lightweight Industrial Fittings

COMBINING the advantages of fluorescent and incandescent light sources, the "Argyll" and the "Arran" are two new fittings that have been added to the range marketed by PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London W.C.2. Each of these units is of the instant-self-start type, and is arranged with a lightweight industrial type batten. The Argyll is a single-tube fitting with a 40 W 4-ft tube and a tungsten ballast lamp at one end, while the Arran duplicates this arrangement, with a tungsten lamp at either end. Prices, including purchase tax on the lamps, are 78s. 3d. and 129s. 6d. respectively.

Mine Shaft Signalling

TWO new types of Nife-Neverfayle self-contained steel-clad battery units for use with mine shaft signalling equipment, have just been developed by NIFE BATTERIES of Redditch, Worcestershire. These units can be supplied on a single or dual battery system and are complete with their charging equipment. This latter consists of a full-wave bridge-connected, selenium rectifier in conjunction with a transformer of the double wound, vacuum impregnated type with tapped primary and secondary windings. Complete control is afforded by a 4-position master switch, with mechanical and electrical interlocks to prevent incorrect switching.



Nife's Neverfayle units for mine shaft signalling are self-contained

In the single battery system, the signalling load is connected directly to the battery and is compensated by a low rate charge. Provision is, however made for high rate charging if necessary.

The dual battery system has one battery connected while the other remains on open circuit or charge. The switching from one to the other is carried out by the rotary switch.

Storage Block Sterilising

IN view of the demand for a low-priced storage block sterilising chest of high quality, the G.E.C. has produced a new unit.

Economy of first cost and running costs has been made by simplifying the construction and by raising the efficiency of steam utilisation.

The chest is particularly suited for sterilising steel utensils and milking clusters and when it is packed to the recognised density of 4½ lb of steel-utensils per cu. ft. of capacity it will, in normal circumstances, reach a sterilising temperature of 210° F within 15 minutes. The electrical loading is only 1 kW, so that the chest may be connected to low capacity mains. It is suitable for off peak operation and is relatively unaffected by power cuts.

The cabinet is of sheet steel, galvanised after manufacture, and the only projection in the interior is the steam entry pipe. The door has a quickly replaceable heat-resisting asbestos gasket, the clamps give smooth and easy operation, and the hinges may be reversed easily on site.

The steam generator incorporates a heavy thermally-insulated cast iron storage block, fitted with heaters of the embedded type. Terminals are outside the heat zone, and ready access from the front is obtainable to all components which may require inspection or maintenance.

Steam from the generator passes to a 4-way valve, from which it may be directed into the cabinet, or to outlets on either side of the chest. Control of the rate of steaming is effected by means of an adjustable valve, which can be set to give the most economical rate of steaming.

The price of the chest, including a 15-day hand-wound time switch is £90.

Lighting Fittings Increase

IT is announced by EKCO-ENSIGN ELECTRIC LTD., Southend-on-Sea, that owing to the continued increase in the cost of raw materials, labour, transport, etc., the prices of fluorescent fittings, control gear and accessories are now increased by a further 5%. As this is additional to the 5% now in operation, the list prices shown in current literature are now subject to a 10% increase as from January 14, 1952. Purchase tax where applicable is increased proportionately.

Starter switches types FS.601, FS.605, FS.401 and S.2000 are not subject to any increase in the list prices.

Owing to difficulty with supplies, the range of tungsten fittings is temporarily suspended and inquiries should be directed to Area Sales Offices. Wherever supplies are available, the list prices are subject to the February 12, 1951 increase, detailed in the catalogue, plus a further 10% as from January 14, 1952.

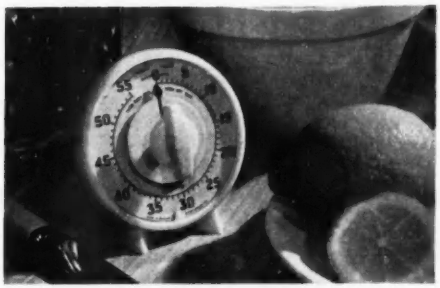
"Plastalux" shades are restricted to model P.F.22 and the price is increased to 5s. each, plus 1s. 3d. p.t. as from January 14, 1952.

Tungsten and fluorescent lamps remain at prices as in the current catalogue.

It should be noted that the above increases will apply to deliveries made on and after January 14.

Audible Timing

SOME time ago SMITHS ENGLISH CLOCKS LTD., Cricklewood, N.W.2, introduced their Minute Timer, an instrument of particular value in timing such processes as pressure cooking. This



Smiths Minute Timer has been redesigned

has now been redesigned as Smiths Minute Timer No. 2. It is soundly constructed of plastic material and as is shown in the illustration has a streamlined appearance. The dial is totally enclosed.

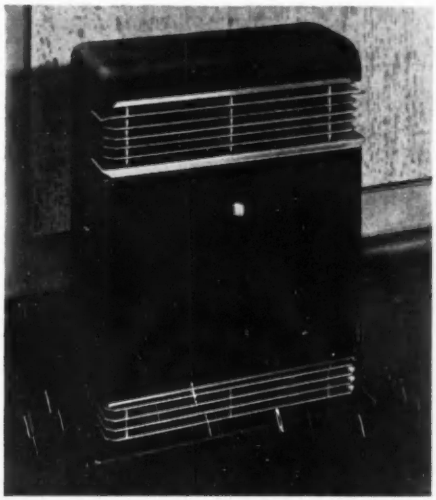
The changeover from metal to plastic construction has been adopted in order to ensure that there will be continuity of production during these days of material shortage. The price of the timer is 19s. 11d. retail.

Heat by Convection

PRODUCED by BRITISH NATIONAL ELECTRICS LTD., Newarthill, Motherwell, two recently produced convectors incorporate several new design features. Their general appearance is both modern and pleasing with black crackle finish and anodised flame gold inlet and outlet louvres.

Two models are available, the Model P.20T having a numerically graded thermostat to ensure sensitive control of air temperature over a range from 60° to 130° F, and the Model P.20S of similar general design, but with switches fitted to control 1 kW of the total loading in lieu of the thermostat.

This latter model also has additional terminals, however, to enable it to be connected to an independent thermostat as an alternative means of



The appearance of the latest B.N.E. convectors is pleasingly modern

control. For this purpose a matching instrument is available.

Accessibility to the wiring elements and thermostat control is facilitated by the incorporation of a removable panel in the back of the unit. A noteworthy feature is the fact that the thermostat in the P.20T type is located in the air inlet, and is thus shielded from all heat radiated and conducted from the light-weight elements.

As all the weight is concentrated at the base, the units are highly stable and the design is such that no external parts reach a high temperature. To prevent the introduction of children's prying fingers a safety mesh is fitted to the louvres.

Both models are 24½ in. high by 19½ in. wide and 8½ in. deep. They are of 2 kW loading and suitable for the standard voltages of 200/250 V a.c. If not thermostatically controlled d.c. mains may be used.

Prices are £17 7s. for the P.20S and £19 1s. 9d. for the P.20T. Both these prices are inclusive of purchase tax.

TRADE PUBLICATIONS

ELECTRICAL CONTACTS.—Two of the data sheets on electrical contacts which are published by Johnson, Matthey and Co., Ltd., have been substantially revised. The first of these is No. 2320, which deals with the properties availability and selection of the various contact materials. No. 2321, the other revised sheet, lists the standard range of headed contacts and notes new code numbers for some of the older standard types. These data sheets are available free of charge from Johnson, Matthey and Co. Ltd., 73 Hatton Garden, London, E.C.1.

British Standards

B.S. Handbook No. 13—Mechanical Tests for Metals. *Price* 17*s.* 6*d.* Formulation of suitable tests by which the quality of metal products could be assessed without having recourse to full-scale testing was undertaken by the British Standards Institution as one of its earliest tasks. This resulted in the adoption of a series of standard tensile test pieces. Since that time, a number of British Standards have been issued which deal with different types of mechanical tests and a number of other standards include requirements for specific applications of these tests.

The standards that deal solely with mechanical testing, together with extracts from other standards to illustrate particular applications of the tests, have been collected under one cover to form a new handbook, and so provide a reference book useful to industry and to universities and technical colleges where the subject of "strength of materials" is taught.

The development of standard methods of test and their importance in the field of mechanical testing are reviewed in an introduction contributed by Dr. H. J. Gough, F.R.S., who is a member of the Mechanical Engineering Industry Standards Committee and was for many years closely connected with the work, being for some time chairman of some of the committees concerned.

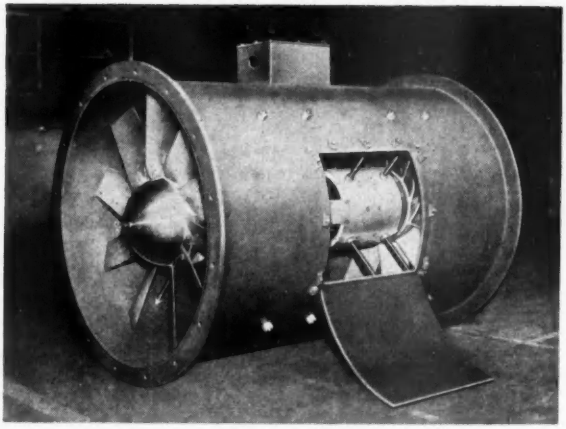
The final section of the book embodies a comprehensive series of conversion factors and conversion tables, which include values of stresses and moments of inertia converted from inch-pound units to metric units and vice versa.

Electrically Heated Pitot and Pitotstatic Pressure Heads for Aircraft *B.S. G.*135: 1591. *Price* 1*s.* In addition to specifying the requirements for electrically heated pitot heads, this specification deals with two grades of pitotstatic heads, i.e.: Grade I: suitable for use at Mach numbers greater than 0·85; Grade II: suitable for use at Mach numbers up to 0·85.

British Standards reviewed above are obtainable at the prices indicated from the British Standards Institution, 24 Victoria Street, London S.W.1.

Aerofoil Axial Fans

Growing application in Marine plant



IN the past, a limiting factor in the use of axial-flow type fans for marine use has been the noise produced by the high tip speed. This has confined the use of these fans to static pressures of up to about 1½ in. water gauge. Higher pressures have been developed by using multi-stage fans with stationary inter-stage guide vanes, but the system is costly. The latest advance in this field is the aerofoil contra-rotating two-stage fan now being made on a quantity basis by Woods of Colchester. These have two opposite-handed impellers, driven in opposite directions by two independent motors, and will develop 2¾ times the pressure of a single-stage unit of equal size and speed, without a proportionate increase in blade noise.

In the motor ship *Atreus*, four 38 in. fans of this type are used for ventilating machinery spaces. Each moves 13,500 cub. ft/min against a static head of 1·0 in. water gauge, absorbing 3·5 b.h.p. The total efficiency of the fans is quite high, being in the neighbourhood of 73%.

As the expelled air travels in a straight line, the turbulence losses are largely avoided, and it is practicable to connect units in "series" to attain pressures as high as 20 in. water.

A further point of some importance is that on d.c. supplies a simple form of volume regulation is available, as either full or two-thirds volume may be obtained when the two motors are connected in parallel or series by the controller.

The fans are available in a range of sizes from 6 in. to 48 in. diameter.

THE WEEK

COMMERCE *in news* INDUSTRY

Steel Distribution Guide

A GUIDE to the iron and steel rationing scheme which is to be introduced on February 4 has been published by H.M.S.O., price 1s. Many details have been issued by the Ministry of Supply, and reported in these columns, periodically since interim measures were announced last summer, but this booklet entitled "Iron and Steel Distribution Scheme—Notes for Consumers," sets out to explain not only the scheme itself, but also the procedure to be adopted in application. Among its contents the booklet states the types of iron and steel covered, and exemptions, description and illustrations of necessary authorisation forms and a reference table of Government Departments which can sanction the use of steel. In addition there is an alphabetical list of products for which bulk authorisations are issued (where I.S. Authorisations are unnecessary), and sections on the Small Consumers' Scheme and Illegal Uses of Iron and Steel.

Token Import Scheme for 1952

IT was announced by the Board of Trade last week that the Token Import scheme of 1951 is to be continued during the ensuing year for imports from Canada and the U.S., although it will be at a reduced level. The scheme allowed manufacturers in a number of countries to send to Britain 40% by value of their pre-war trade in specified commodities. Besides Canada and the U.S., the countries were Australia, India, Pakistan, Scandinavia, Italy, Switzerland, France and the Benelux countries. Imports of all previously listed goods from countries now excluded will be licensed up to at least the token import level. Detailed arrangements for 1952 are being worked out and will probably be announced within the next few weeks.

Accidents from Electric Fires

A MOVEMENT is afoot in Birmingham to reduce the number of accidents in homes which result in burns. Efforts are particularly relevant to gas and electric fires. A special committee recently inspected some twenty types of fireguards for these types of fires, which are considered essential as a preliminary deterrent to such accidents. It is suggested that all gas and electric fires offered for sale should comply with safety specifications laid down by B.S.I. or other competent body. Consideration of the more difficult problem of guarding coal fires is to follow in due course.

Meanwhile, Mr. D. G. Bullard is drafting his Private Members' Bill, with Home Office help, to prevent the sale of inadequately-guarded heating appliances, and to illustrate the reason for the Bill, one can do no better than return to Birmingham and consider the six-year study carried out by the Burns Unit of the Accident Hospital there. The study revealed that during the six years gas and electric fires were responsible for 144 accidents, 20 of which proved fatal. A point which will inevitably be raised in Parliament is that manufacturers are unable to obtain the metal necessary to fit each fire with a guard. An ample allocation for this purpose will therefore have to be urged.

Revised Details of P.T.

THOSE who are involved in the imposition of purchase tax on various electrical goods will no doubt welcome the new and revised copy of Notice No. 78, which details all items chargeable with the tax. The new notice supersedes that published in January, 1951, and all additions and amendments issued by the Commissioners of Customs and Excise up to October 31 last. Copies of the new editions are being sent to Trade Associations and all traders registered for P.T. purposes.

Credit Terms—an Indication?

A SOUND indication of the pressure which the Government wishes to apply in its programme of credit restriction may be gained from the electricity supply industry, said Mr. A. Harold Bibby, chairman of Martins Banks, in his annual statement to shareholders last week. The Government-owned electricity supply industry, he said, was

The First Half Century

A futile correspondence has recently been going on in *The Times* as to how we are to name a wireless telegram when it comes into commercial use. Mr. E. A. Grimley, advocates the word "Ethergram" for the message, 'Ethergraph' as the analogue of 'Telegraph', and 'Ethergraphy' for the process. These monstrosities, he asserts have the approval of Dr. Oliver Lodge. For the present we can get along very well without a new word, and when the need arises the word will come without our worrying Greek scholars—good, bad or indifferent to coin it for us. Most likely it will be some American invention, about as euphonious as 'booster'.—*From our issue of January 16, 1902.*

among the most prominent promoters of hire-purchase in the country. Comments on the Treasury request to banks and financial houses to limit their allowance of hire-purchase credit were made by "Meteor" in our January 3 issue. As stated then, retailers who were possibly the greater users of hire-purchase terms, were still trying to recover from the lower interest rates charged by Area Boards, while the Boards themselves are feeling the effects of capital limitation.

Opinion on B.E.P.C. Economy

A LETTER was read at last week's meeting of London Consultative Council, proposing a substantial reduction in the size of the B.E.A. delegation to the B.E.P.C. As reported in our December 27 issue, the period of the Convention has been shortened in order to effect economy deemed necessary during the present times. As far as the Consultative Councils are concerned, the recent proposition allows one delegate from each, which, as one member pointed out, automatically assigns the chairman as representative. London's chairman, Mr. I. J. Hayward, said it might be better to reduce the number of conferences rather than the number of delegates. The B.E.P.C. could be held bi-annually, he suggested. This view was supported by other members and will be forwarded to the Board.

A favourable reception was accorded to L.E.B.'s explanation of the reserve fund totalling £1,672,750 although no assurance could be given to a member who enquired whether the reserve would discount any increase in tariffs in the area.

Meter Readers Strike

THE question of the strike of meter readers in the area of the London Electricity Board, to which we referred last week, is to be considered at a meeting of the National Joint Industrial Council for the Electricity Supply Industry today, January 17. Earlier this week the number of members on strike or suspended for refusing to work with supervisors was about 360. In a further statement by the Board, the "irresponsible action by shop stewards" was criticised, it being added that if the meter readers had acted sensibly the strike and all its publicity could have been avoided. The shop stewards seemed, however, determined to provoke a strike unless the Board surrendered its right to secure a fair day's work for a fair day's pay, the Board states.

OFFICIAL PUBLICATIONS THIS WEEK

PURCHASE TAX, NOTICE NO. 78
Details of all goods chargeable with P.T. revised. Issued by H.M. Customs and Excise, City Gate House, Finsbury Sq., E.C.2. (*See page* 129.)

OVERSEAS ECONOMIC SURVEY
Italy. H.M.S.O., 5s. (*See page* 131.)

IRON AND STEEL DISTRIBUTION SCHEME
Notes for Consumers. H.M.S.O., 1s. (*Detailed explanation of rationing scheme to be introduced Feb.* 4.) (*See page* 129.)

Anglo-Canadian Agreement

IT was announced last week by British Insulated Callender's Cables, Ltd., that they have entered into an agreement with the Canadian company Philips Electrical Works, Ltd., for the distribution of certain B.I.C.C. products in the Dominion through the sales organisation of Automatic Electric (Canada), Ltd. This arrangement will closely unite one of the largest manufacturers of cables in Britain with the pioneers in that field in Canada. B.I.C.C. products to be covered by the agreement are understood to include specialised conductors, power capacitors and other apparatus not now manufactured by Philips. On the Philips' side of the bargain, the Canadian firm will have access to technical information and the advantage of extensive European technical research facilities of B.I.C.C.

Ekco-Ensign's new Premises

THE impending move of Ekco-Ensign Electric, Ltd., to London, brought about by the commendable expansion of business, was officially announced last week. As from Monday next the company's headquarters will be at 45 Essex Street, Strand, W.C.2, a new building with all modern facilities and equipment, which will be known in future as Preston House. The company has long since outgrown its accommodation at Southend and in Vigo Street, and the new premises will house the administrative staff, export, technical, illuminating engineering, advertising, southern sales departments and the firm's lighting showrooms. We understand that Ekco-Ensign are also to establish a new store for stocks, packing and servicing at Poplar, but final arrangements have not been completed as yet.

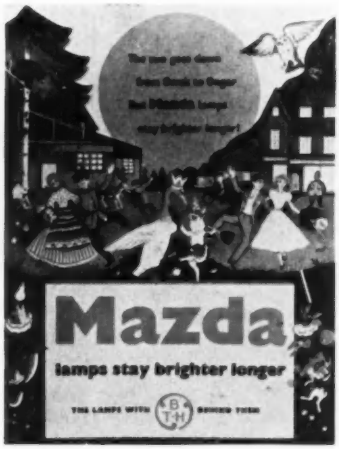
Load Spreading a Success

INDUSTRIAL electricity load spreading for January is estimated to reach 24% of the total load compared with a target reduction of 20% during the remaining winter months, the Southern Regional Board for Industry was told at a recent meeting. During December, when the target reduction was 30%, industry arranged load spreading amounting to 29·6% and large commercial users reduced the demand by 25·5%.

The Board endorsed a recommendation calling for an assurance that clauses in contracts restricting the use of private generating sets, at present waived until 1958, should not be reinstated immediately the supply position improved. It was stated that factories were deterred from installing generators because it was impossible to regain the cost before the operation of private generators was suspended.

Convention on Contacts

THE East Midland Centre of I.E.E. has arranged a Convention on "Contacts," to be held at Loughborough College between April 7 and 9.



Latest additions to dealers' stock of sales aids are these window display pieces produced by the British Thomson-Houston Co. Ltd., and Metropolitan-Vickers Co. Ltd. B.T.H. have two new and colourful cards available, designed to act as central features in window dressings. Metrovick's new assembly deals with quality control in lamp manufacture and measures 5½ ft by 6 ft plus the wings. It is coloured with alternating black and orange panels behind the photographs, and the wings are in blue

Broadly, the three-day proceedings will be divided into two parts, the first on "Light Duty Contacts in Theory and Practice," and the second on "Heavy Duty Contacts," including contactors and sliding contacts. A full programme of papers is envisaged comprising some 15 or more speakers. Accommodation is available for about 80 men at a daily charge of £1 1s., including registration, and for those not staying overnight, meals have been arranged if booked in advanced. Nominal registration fee for each part of the Convention is 2s. 6d. Further details may be obtained from Mr. R. G. L. Ryan, of Brush Electrical Engineering Co., Ltd. Non-members will be welcomed.

Physical Society's 36th Display

THE Physical Society's 36th annual Exhibition of Scientific Instruments and Apparatus is to take place in the Royal College of Science main building and Huxley building, between April 3 and 8. These dates exclude the intervening Sunday and the opening day will be reserved for members and the Press only. This year's show promises to be an even greater attraction than its predecessors as the re-armament programme has caused a natural resurgence of interest in equipment for service use, and the ever-present need for higher productivity and increased exports have made for increased developments in this field. Addresses will be delivered by eminent scientists on the Friday and Monday and exhibits will include the prize-winning entries of the Society's Craftsmanship and Draughtsmanship Competition. The handbook, listing and explaining exhibits, is expected to be available early in March, price 7s. 3d.

Limited Prospects in Italy

BUSINESS prospects for U.K. manufacturers in Italy cannot be regarded as encouraging under present conditions. Were it not for the fact that Italy has a manpower problem, in common with so many other nations today, the sale of goods would be exceptionally difficult. As it is, there are opportunities in fields hitherto little explored, particularly in agricultural commodities and capital equipment for industry. These facts emerge from the Overseas Economic Survey for Italy just published by H.M.S.O. The main difficulty is Italy's anxiety to give the maximum protection to her own industries.

These industries are in fact formidable and electrical engineering for one provides valuable export trade, but at the same time it must be noted that it cannot meet domestic requirements in every sector. A few examples of the extent of industry may serve as an indication of home competition. There are in all 500 electrical firms of which 80 are engaged in small and medium generators and transformers, 70 each in switch and control gear, and radio equipment and 50 each in domestic equipment and telephone apparatus. On the supply side steady revival has taken place since the decline in 1945. Nevertheless, present supplies are barely sufficient to keep pace with demand and there is no doubt that new installations are urgently required.

E.T.U. College Approved

AT THEIR last meeting Esher town council approved a recommendation of their Highways Committee that Esher Place, formerly a girls' school run by Shaftesbury Homes, be used as a training college by the E.T.U. Thus ends a search of some years' duration by the Union to find a suitable site for their college. At the council's previous meeting, as reported in our issue of December 6, a similar recommendation was referred back to the Committee for further consideration. At the same time objections were raised by residents on the adjoining estate on the grounds that the local amenities would be seriously affected. The Union has subsequently written to the Council explaining the purpose of the college.

Export Licensing Arrangements

EXPORTS of semi-manufactured copper and zinc and their alloys during the first quarter of 1952 and until further notice will be licensed at 80% of the rate of export in 1950, the Board of Trade announced on Monday. Because of the world shortage and high demand exports of semi-manufactured copper and its alloys during the period April to December 1951 were restricted to about half the rate prevailing in the first six months of 1950.

Ostrich Attitude must Cease

AN appeal to all supervising engineers to join the A.S.E.E. was made by chairman Mr. J. H. K. Pendry, in his address at the annual dinner and dance of the West London Branch of that Association. The ostrich attitude of the majority of supervising engineers had proved a retrograde step, he said, as evidence the closing salary gap between them and operatives. During the dinner a certificate, on which were inscribed the names of all branch officers and members, was presented to last year's chairman, Mr. A. W. Pelerin.

New Post at Middlesbrough?

IT seems likely that a new post for an electrical engineer will be established at Middlesbrough by the Corporation. Since nationalisation of the supply industry there has been a friendly arrangement with former Corporation employees who are now officials of the Electricity Board to carry out inspection work and supervisory duties. The Council was told a short time ago, however, that this arrangement would have to cease.

Concern in South Wales

ALARM over the decrease in electrical rural development (see our January 10 issue) is not confined to the Eastern Area, as subsequent reports of another Consultative Council meeting, this time in South Wales, indicate equal concern The Board's chairman, Mr. L. Howles, who attended the meeting to explain the situation, said development work had stopped because of restrictions on capital expenditure. The outlook was grim, he said, but one had to be patient during the country's present economic position. Replying to a charge that his Board was less sympathetic than others towards rural schemes, Mr. Howles said other Boards had received larger allocations for such work, but S. Wales had had a fair share in other fields.

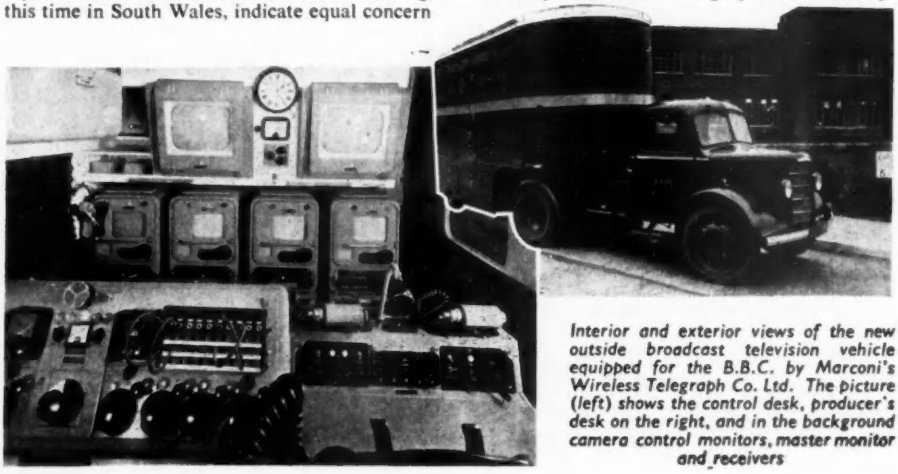
Answering other queries Mr. Howles said the Board's new tariff would probably be submitted to the Council for their consideration within a month.

Teaching Electrical Engineering

IN its seventh number, which we have recently received, the "Bulletin of Electrical Engineering Education" seems to have excelled even its previous high standard of variety and interest. Notable amongst the subjects discussed in this nominally November number is the teaching of synchronous machine theory, on which two differing viewpoints are presented, an article by Professor Kapp on teaching vectors, and a discussion of the transformer vector diagram. Further details concerning the "Bulletin" are obtainable from the organiser, Dr. Eric Bradshaw, College of Technology, Manchester 1.

Tests from Kirk o' Shotts

DAILY test transmissions on low power will probably be carried out soon from the new TV transmitting station at Kirk o' Shotts, it was announced last week. They will consist of test patterns in the early stages, then later develop into still pictures. A further announcement at some future date will supersede the transmission of regular programmes. These low-power transmissions will not give the full coverage that will eventually be obtained at high power, and recep-



Interior and exterior views of the new outside broadcast television vehicle equipped for the B.B.C. by Marconi's Wireless Telegraph Co. Ltd. The picture (left) shows the control desk, producer's desk on the right, and in the background camera control monitors, master monitor and receivers

The British Thomson-Houston Co. Ltd. entered into the spirit of circus and pantomime season in the New Year with this topical display at Crown House, Aldwych, W.C.2. The festive display incorporates Mazda fairy lights and candles and Cinderella Disney lights, also featured in Christmas Press advertising

tion will be far more susceptible to interference. The daily tests will normally be carried out between 11 a.m. and 12 noon and 3 and 4 p.m.

Training Methods for Industry

AN opportunity for personnel and education officers from industry to study the process of gaining knowledge and the principles of teaching methods is offered by a five-day study course which is announced by the Institute of Personnel Management. The course will be held in London from February 10 to 15, and will include lectures on the aim and work of a training policy, and on the technique of constructing a programme. Detailed attention by lecture and syndicate discussion will be given to the teaching of adults, and teaching aids. Joint chairmen of the course are J. de Courty Meade, personnel officer of Philips Electrical Industries Ltd., and J. H. P. Summers, training officer, Institute of Personnel Management. Further details can be obtained from the Courses Secretary, Institute of Personnel Management, Management House, 8 Hill Street, W.1.

Mechanical Handling Exhibition

THERE are estimated to be some 170 firms exhibiting at the third Mechanical Handling Exhibition, to take place at Olympia between June 4 and 14 this year. Space covered will be approximately 250,000 sq. ft. Most notable among items to be shown will be new giant fork lift trucks with a lifting capacity of 5 tons, shown for the first time in this country, automatic crate-packing machine and a fork truck on giant pneumatic tyres. A variety of papers are scheduled for the concurrent Convention, one with a particular electrical flavour being "Installation and Maintenance Aspects of Electric Overhead Travelling Cranes." Tickets may be reserved through the organisers, Associated Iliffe Press, Dorset House, Stamford Street, S.E.1.

Forming a Library

LIBRARY research is a lengthy preliminary in the thorough investigation of any new engineering problem, but the results may be so useful and time-saving that it is unwise to omit this step. Recognising the help which can be given to engineers and scientists in this branch of their work by an efficient works or laboratory library, the D.S.I.R. has now made special arrangements for a consultancy service to be available on the subject. For this purpose, a grant has been made to Aslib (formerly the Association of Special Libraries and Information Bureau) for the establishment of such a service, details of which are obtainable from the Director, Aslib, 4 Palace Gate, London, W.8.

F.B.I. President in Scotland

SPEAKING to F.B.I. members in Scotland at their annual general meeting on Friday, Sir Archibald Forbes, president of the Federation, surveyed prospects of industry for 1952. After dealing with some problems associated with steel rationing, he went on to deprecate any tendency to export capital equipment overseas at the expense of the home market. However attractive such a policy might be as a "stop-gap" measure, he suggested, its long-term effect would be extremely serious for the country.

NEWS IN BRIEF

Presentation of awards for educational successes was made recently at both the Leigh and Erith works of B.I.C.C. It was reported that a greater degree of success had been achieved during 1950-51 than in any previous year—one student gained his B.Sc., and other achievements ranged from those in primary courses to the higher national certificate.

Honour of the first ship launched on the Tyne this year will go to Cable and Wireless, Ltd.'s *Stanley Angwin*, to be launched on February 11. Makers are Swan Hunter and Wigham Richardson Ltd., who have previously built 20 such cable ships.

We have been asked to draw readers' attention to the advertisement of Fenton, Byrne and Co. Ltd., which appeared in our January 3 issue. The telephone number was incorrect and should have read Elmbridge 6724/5.

Tees-side branch of E.I.B.A. are to hold their 12th annual ball at Middlesbrough town hall on February 29. Tickets from hon. sec. Mr. W. E. Dalby, Electricity Service Centre, 4 Russell St., Middlesbrough.

Electric Supply News

Brighton

The South Eastern Electricity Board has notified approximately 500 consumers in Brighton that their electrical maintenance contracts signed in 1935 are to be terminated and new contracts signed. These consumers have had a maintenance contract covering cooker, water heater and wash boiler for £1 a year, including replacement of parts. The Board points out that the old scheme is uneconomic. The new scheme provides for maintenance of an electric cooker only for £1 a year.

Eire

The removal of electricity rationing, because of the improvement in the available generating plant, was announced by the Electricity Supply Board last week. Recently the first generating unit in the Cathaleen's Fall station of the Erne scheme began the supply of power. Now there is an early prospect of the first unit in the Allenwood turf station being brought into use. New connections for heating, other than night storage and process heating, are still not permitted. Further connection of storage water heaters is also not yet permitted.

Guildford

The Southern Electricity Board has asked for a contribution of £2,138 by the Council towards the cost of laying electricity mains and service cables for the first 130 houses on the Binscombe estate. The Housing Committee considered the Council ought not to be required to contribute more than the cost of the service connections, and the officers have been instructed to ask the Board to withdraw its request.

Keadby

It is expected that the new Keadby generating station, Yorkshire Division of the B.E.A., will be in operation next month. Erection of the first of six 60 MW hydrogen-cooled alternators was completed recently.

Malvern

An application by the Midlands Electricity Board to erect overhead cables to the Cockshot Road housing estate has been refused by Malvern Urban Council.

Northern Ireland

Larne Borough Council at a meeting last week decided to write to the Ministry of Commerce asking questions on the variance in the cost of electricity in the Province. In the discussion Ald. C. Ross said they were assured when the 1948 Electricity Act was under consideration, and Belfast and Londonderry were exempted from paying their share of the cost of "rural development", that the charge for current to factories outside the Belfast area would not be increased above the Belfast charges. He asked how the rates compared at present, how much of the increase was due to rural development, and had the corresponding increase been made by the Board to the Belfast Corporation for current supply?

Skye

Engineers of the North of Scotland Hydro-Electric Board, and of Siemens Brothers and Co. Ltd., were last week engaged in making good the damaged submarine cable between Skye and the mainland. The cable was damaged when a ship dragged its anchor in the recent gales. It was found that the cable was damaged about 250 yards from the Lochalsh shore. While the repair work went on the 730 consumers (representing about 2,500 of the island's 9,000 population) returned to a paraffin lamp and candle existence.

Southampton

Trial bores have been made on the site of the new Marchwood power station for the B.E.A., but work on a large scale will not begin until the end of this year, it is reported.

LIGHTING SCHEMES

Blyth.—The M.o.T. has approved the T.C.'s plan to convert street lighting from gas to electricity. Application is being made for the necessary loan sanction. The first stage of the work will cost £5,600.

Esher.—T.C. has approved a £4,750 scheme for improving lighting on the Portsmouth Road between the Surbiton boundary and the Silly Isles at Esher. The scheme provides for 62 140 W sodium lamps.

Hinckley.—The U.D.C. is considering a scheme for electric lighting along part of the Birmingham-Gt. Yarmouth Road, at a cost of £9,421.

Hove.—A special sub-committee has carried out a survey of street lighting, with a view to making improvements.

Mansfield Woodhouse.—The U.D.C. is to reorganise street lighting, and also proposes to install mercury vapour lamps in 8 streets under a priority scheme.

Ossett.—T.C. applying for consent to borrow £2,600 for electric street lighting in Station Road.

Oswestry.—A new system of lighting for the trunk road through the town will cost £2,336. Application is to be made for the necessary loan sanction.

Salford.—T.C. is seeking M.O.T. approval of improved lighting in Leicester Road, at a cost of £4,634, Eccles Old Road (cost £7,993), and Regent Road (£2,575).

Scunthorpe.—A scheme for improved lighting of Brigg Road has been submitted to the M.o.T.

St. Pancras.—B.C. has prepared schemes for improved lighting (mercury vapour or sodium) for Euston Road (Hampstead Road to Osnaburgh Street); Royal College Street; Highgate Road and Highgate West-hill to Southgrove.

Company Activities

Anti-Attrition Metal Co. Ltd.

Manufacturing profit, including trade adjustments with subsidiaries, for the year ended July 31 is £71,193 (*£40,685*), and with other income the total becomes £76,879 (*£46,319*). To depreciation £11,250 (*same*), to staff superannuation fund £1,000 (*£500*), to reserve for taxation £38,000 (*£16,000*), and to reserve for proposed 10% dividend £21,000 (*£22,000*) leaving £6,530 (*£2,394*) carried forward. The increase in the profit, of approximately £30,500, was caused by extra turnover in the firm's standard production for important export, rearmament and home demands, Mr. S. P. Loosen, chairman, explains. The parent company as well as its subsidiaries are full of orders, he adds.

Associated Engineering Holdings

A taxed net profit of £596,083 is shown for the year to September 30 last, compared with £397,474 for the previous twelve months. Net manufacturing and trading profit is £1,540,331 (*£1,009,514*), of which £746,601 (*£452,828*) goes in taxation and £197,647 (*£159,212*) to depreciation. The sum of £150,000 is placed to subsidiary companies' plant replacement and £250,000 (*same*) to general reserves. There is £138,927 (*£99,471*) carried forward. Mr. A. H. Jarrard, chairman, states that the expansion and modernisation approved by the board will cost some £750,000 over the next few years. Commitments for £300,000 of this total have already been entered into, he adds.

Automatic Telephone & Electric Co.

Resolutions to increase the authorised capital of the company to £3,560,000 by the creation of 1,000,000 Ordinary shares of £1 each, were duly passed at the special meetings last week.

British Industrial Plastics Ltd.

Group profit for the year to September 30 last is £557,451, compared with the previous year's figure of £394,239. After allowing for depreciation, taxation and other charges, the net profit is £159,957, as against £111,201 for the previous twelve months. The final Ordinary dividend is again 10%, making 20%, but payable on the increased capital. A bonus of ½d. per 2s. share ($2^1/_{12}$%), tax free, is also recommended out of a capital profit derived from the sale of part of an investment. The sum of £75,000 (*nil*) is transferred to contingency reserves, £75,601 (*£65,380*) is absorbed by dividends, and there is £133,058 (*£123,702*) carried forward.

English Electric Co.

In connection with the offer of 1,179,577 new Ordinary shares recently made to Ordinary stockholders, it is announced that a total of over 1,800,000 shares were subscribed or applied for; over 95½% of the issue was taken up and more than 2,500 applications for excess shares for a total of approximately 675,000 shares were received. The Prudential Assurance Co. took up £2,900,000 of the £3,000,000 4½% debenture stock, 1972-77, which was placed privately at par by Lazard Brothers last month, it is now revealed. Prudential Nominees subscribed for the remaining £100,000 of the issue. It was originally intended to make a public issue, but in view of the failure of the Unilever 4% debenture offer, the company decided to place the stock privately.

Henry Meadows Ltd.

Trading profit for the year ended August 31 last is £11,108 (*£67,426*). After accounting for various expenses and provision for depreciation, the net loss for the year is £52,287. In his statement, Major-General W. S. Tope refers to the year as a whole as being a difficult one. In the early months they felt the impact of completing orders for products to customers' special requirements at unattractive prices, and then came the shortage of essential materials for the completion of products. The Board believe that the company will trade at a profit during the next eight months, but it is unlikely that the financial position of the company at the end of the year will justify the resumption of Ordinary dividends. The order book is now at a higher level than at any time in the past four years, and includes a very substantial contract from the Ministry of Supply for generating sets in connection with the rearmament programme. A quantity of orders has been received for generating sets based on the new DC970 engine, of 180 b.h.p. (270 b.h.p. supercharged).

Morphy-Richards Ltd.

The issue to stockholders of 55,000 Ordinary 4s. shares at 14s. each was over-subscribed by way of rights and by applications for further Ordinary shares. Applications for up to 400 additional Ordinary shares have been satisfied in full, but above that figure allotments have been scaled down. Of the 130,000 6% Redeemable Cumulative Convertible Preference £1 shares offered to stockholders at par, approximately 91% was left with the underwriters.

Scottish Cables Ltd.

The 4,383 shares not taken up by way of right have been allotted to applicants of excess shares on the basis of applications up to 25 shares in full and other applicants 25 shares each.

Southern Brazil Electric Co.

For 1950 the gross income was £165,569 (*£101,775*), and after net interest and other deductions, of £27,227 (*£10,816*), and net exchange loss of £129 (*£105,282*), the net income left is £138,213 (*loss £14,323*). To statutory provision £3,774 (*£8,351*), tramway revenues to municipality of Piracicaba on sale of tramway property, £10,892 (*nil*). The deficit carried forward is £71,557 (*deficit £195,104*).

Dividends Declared

Hackbridge Cable Holdings.—Interim of 7½% (*same*).

Worthington-Simpson Ltd.—Interim dividend of 10% (*same*), payable on January 31.

Commercial Information

CONTRACTS OPEN

HOME

Jan. 18.—Cheshire. Electrical work at Little Sutton, Neston and Dunkinfield schools, and at Altrincham College (first stage). Names to E. Mainwaring Parkes, County Architect, The Castle, Chester, by above date. Deposit £2 2s.

Jan. 19.—Bootle T.C. Electric cables and flexes, and lamps included in list of supplies for year beginning April 1. Borough Surveyor, Town Hall.

Jan. 21.—Ealing T.C. Lamp columns included in list of supplies needed for year ending March 31, 1953. Borough Engineer and Surveyor, Town Hall, Ealing, W.5.

Jan. 21.—East Retford R.D.C. Supply and erection of two electrically driven borehole pumping plants at Everton pumping station. Consulting Engineer, John H. Haiste, 4 Queen Sq., Woodhouse Lane, Leeds 2.

Jan. 21.—Westminster. Supply of electric lamps, cable, etc., for periods of 3, 6 or 12 months beginning April 1. Town Clerk, Westminster City Hall, Charing Cross Rd., W.C.2.

Jan. 21.—Wicklow. Electrical installation in enlarged district hospital, Baltinglass. Consulting engineers, J. A. Kenny and Partners, 44 Kildare St., Dublin, C.17. Deposit £15 15s.

Jan. 22.—Edinburgh. Supply and erection of water turbine and 80 kW alternator with necessary wiring and switchgear at Fairmilehead Filters. City Water Engineer, 6 Cockburn St.

Jan. 23.—Winchester. Electric lamps included in list of supplies for 12 months ending March 31, 1953. City Engineer's Dept., Guildhall.

Jan. 25.—Northwich R.D.C. Maintenance of consumers' side of electrical installation in council's 3,500 houses.

Jan. 26.—Northampton R.D.C. Wiring of 40 houses on various estates with possible extension to 80. Architect is R. J. Miller, 1 Cheyne Walk.

Jan. 28.—Nuneaton T.C. Installation of street lighting on Camphill housing estate. Borough Surveyor, Council House. Deposit £2 2s. (See Jan. 10 issue.)

Jan. 29.—Rochdale T.C. Installation of electrical motive power to machinery and plant at Technical College. Borough Surveyor, Town Hall.

Jan. 30.—Southwark B.C. List of supplies required includes electric lamps. Town Hall, Walworth Rd., S.E.17.

Feb. 1.—Tottenham. Supply of electric lamps required. M. Lindsay Taylor, Town Clerk, Town Hall, Tottenham, N.15.

Feb. 1.—Belfast. Supply and erection of three-phase 33 kV oil-immersed reactor of non-ferrous shielded type. Tenders also invited by Feb. 15 for supply and erection of chlorinating plant with pumps and all associated equipment. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit in each case, £5 5s. (See Jan. 10 issue.)

Feb. 1.—Belfast. Tenders are being invited by Electricity Dept. for annual supply of stores, including transformer oil, transformer kiosks, insulated cables, lamps, washboilers, kettles, etc. Dept. is at East Bridge St., Belfast. Deposit 10s. (See Jan. 10 issue.)

Feb. 1.—Stafford T.C. Provision and erection of a number of automatic-controlled electrically driven centrifugal pumping units. T. H. Higson, Borough Engineer and Surveyor, Mount St. Deposit £3 3s.

Feb. 2.—Prestwich T.C. Lamps and electrical equipment included in supplies wanted for 12 months ending Mar. 31, 1953. Borough Engineer, Town Hall.

Feb. 4.—Hendon T.C. Supply and installation of open-type lanterns for 140 W sodium lamps with transformers, condensers and ancillary equipment for lighting of North Circular Road between Brent Cross and Edgware Rd. Also supply of reinforced concrete columns for same scheme. These are separate contracts. A. O. Knight, Borough Engineer and Surveyor, Town Hall, N.W.4. Deposit £2 2s. in each case. (Both advertised this issue.)

Feb. 5.—Gillingham (Kent) T.C. Supplies for year beginning April 1 include switches and accessories, conduits and accessories, wire and cables, cooker, wash-boiler and fire spares, lamps, etc. Borough Engineer and Surveyor, Municipal Buildings, Gillingham.

Feb. 6.—Manchester. Supply of (a) bowl reflector lanterns for 80/125 W H.P.M.V. lamps, and (b) sets of auxiliary equipment for 125 W H.P.M.V. lamps; for year ending Dec. 31, 1952. City Surveyor, Town Hall, Manchester 2. (Advertised in this issue.)

Feb. 9.—Swansea T.C. Lamps for public lighting and lamp pillars included in list of supplies wanted by year beginning April 1. Borough Engineer and Surveyor, Guildhall.

Feb. 9—Ruislip-Northwood U.D.C. In list of supplies required for year beginning April 1 electric lamps is included. Engineer and Surveyor to Council, Council Offices, Northwood, Middx.

Feb. 11.—Manchester. Electrical installation at Crab Lane county school, Blackley. City Architect, Town Hall. Deposit £1 1s. (See Dec. 20 issue.)

Feb. 11.—Stalybridge, Hyde, Mossley & Dukinfield T & E. B. Installation of electric light and power for new bus garage. Architects, Howard and Benson, 88 Mosley St., Manchester 2. Deposit £2 2s.

Feb. 14.—Merthyr Tydfil T.C. Electrical installations at Pentrebach infants', Edwardsville junior mixed, Woodlands, Brecon Rd. infants' and Merthyr R.C. schools. Also the same at Caedraw junior mixed, Queens Rd., Pant and Dowlais infants' schools. These are separate contracts and deposit in each case is £2 2s. Borough Engineer's Dept., Town Hall. (Both advertised in this issue.)

Feb. 15.—Belfast. Supply and erection of bulldozer with capacity of 120 tons coal per hour, minimum h.p. of 100 for engine, for Victoria power station. Merz and McLellan, Consulting Engineers, Carl ol House, Newcastle-on-Tyne. Deposit £5 5s. (Advertised in this issue.)

Feb. 18.—Denbighshire. Electrical installation in proposed new grammar school at Ruabon. Names to G. D. Wiles, County Architect, Grove Park, Wrex-

ham, by Jan. 29. Deposit £3 3s. (Advertised in this issue.)

Feb. 25.—Hastings T.C. Rewiring of electrical installation at Clive Vale secondary school. Borough Engineer, 37 Wellington Sq. Deposit £2 2s.

Feb. 25.—Herne Bay U.D.C. Supply and installation of two electrically-driven sewage pumping units each of 500 g.p.m. capacity, with switchgear, etc. W. W. Smith, Engineer and Surveyor, Council Offices. Deposit £2 2s.

Feb. 27.—Birkenhead. Lamps and cables included in list of supplies required for year beginning April 1. Transport Manager, Transport Offices, Laird Street.

Feb. 27.—Stoke-on-Trent. Rewiring of lighting and power installations at "Westcliffe," Turnhurst Rd., Tunstall, Stoke-on-Trent. Applications to Harry Taylor, Town Clerk, Welfare Services Dept., Kingsway, Stoke, by Jan. 26. Deposit £2. (See Jan. 3 issue.)

Feb. 27.—Tynemouth T.C. Supply and erection of four electrically operated pumping units, each of 1,300 g.p.m., at Mitford. Water Engineer and Manager, 8 Northumberland Sq., North Shields. Deposit £3 3s.

Mar. 1.—Bridgwater T.C. Supply and installation of two electrically driven pumps. Borough Engineer, Town Hall. Deposit £2 2s.

No date stated.—Sutherland. Electrical work in erection of Helmsdale J.S. school. Baxter, Dunn and Gray, quantity surveyors, 235 Bath St., Glasgow.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Feb. 5.—New Zealand. Post Office invites tenders for supply of four miles of telephone cable, textile-covered, lead-sheathed, 50 pairs. Director General (Stores Division), G.P.O., Wellington. B.o.T. (Ref. CRE (1B) 79195/51).*

Feb. 8.—Uruguay. Usinas Electricas y Telefonos del Estado invites tenders for supply of distribution board for Treinta y Tres power station. B.o.T. (Ref. CRE (1B) 78904/51).*

Feb. 11.—India. Tenders invited or some 3,500 lightning arresters to various specifications by Stores Purchase Committee, Govt. of Travancore-Cochin, Trivandrum. B.o.T. (Ref. CRE (IB) 79163/51).*

Feb. 18.—Turkey. Supply of 13 electric trolley buses, and provision and erection of two 600 V rectifier stations and of 8 km of overhead supply line with ancillary equipment. This is for Ankara Electricity, Gas and Bus Administration. B.o.T. (Ref. CRE (1B) 78546/51).*

Mar. 5.—India. Government of Madras, Electricity Dept., is inviting tenders for remodelling of Madras distribution system, involving substation structures, outdoor and indoor switchgear, and power transformers for 33, 11 and 5 kV substations. Dept. is at 157 Mount Rd., Madras. B.o.T. (Ref. CRE/166/52).*

Mar. 6.—Sydney. Supply of 11 kV 250 MVA metalclad switching equipments for Holroyd No. 2 substation, for C.C., Queen Victoria Building, George St. B.o.T. (Ref. CRE (1B) 79239/51).*

April 15.—New Zealand. Manufacture and supply of four single-phase, double wound transformer units, each 6,667 kVA, 110/6·35 kV, 50 c/s, outdoor type, oil immersed, tap-changing on load and preferably natural cooled, for New Plymouth substation. State H.E. Dept., Wellington. B.o.T. (Ref. CRE (IB) 79201/51).*

CONTRACTS PLACED

Burnley T.C. Installation of electricity in 52 houses being built on Brunshaw estate, Wm. Townson and Sons Ltd., £1,830.

Camberwell B.C. Electrical work on Cleve Hall housing estate, Iverson Electrical Ltd., £3,704. (Original tender withdrawn.)

Inverness. Installation of electricity in houses at Mallaig, Western Battery Service, £2,011.

L.C.C. Electrical installation at Ennersdale primary school, London Electricity Board; same at Downderry primary school, Thorpe and Thorpe Ltd.

Rhondda U.D.C. Installation of electricity in 150 houses at Maerdy, S. Wales Electricity Board, £3,190.

Sheffield. Electrical installation in 506 dwellings on Birby estate, M. J. Gleeson (Contractors) Ltd., £9,549; installation of electric lighting at Ecclesall county school, Yorkshire Electricity Board, £2,269.

TRADE NOTES

B.E.A.M.A. Contract Price Adjustment Formulae. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at January 12, 1952, shall be deemed to be 134s. (*b*) "Cost of Material"—the index figure for Intermediate Products last published by the Board of Trade on January 12 is 370·8 and is the

Your Queries — Answered

"Nebro" accessories, makers of? L.E.—Neville Brown and Co., Ltd., 77 Newman St., W.1. (22413)

"Clipon" inspection lamp, makers of? T.E.—C. M. Churchouse, Ltd., Clarendon Works, Clarendon Cross W.11. (22426)

"Everay" violet ray apparatus, makers of? B.C.—These were produced by I. Calvete, Ltd., who cannot undertake repairs. Try Watson and Sons (Electro-Medical), Ltd., East Lane, North Wembley, regarding replacement electrodes. (22435)

"Clayton" heaters, makers of? E.N.—Clayton Dewandre Co., Ltd., Africa House, Kingsway, W.C.2. (22441)

"Kingsholme" kettles, makers of? E.D.—These were made by Kee Radio and E. Equipment, Marsh Works, Kings Rd., High Wycombe, a firm which went out of business about a year ago. (22447)

"Wagner" motors, agents for? E.S.—Fattely & Sharp, Ltd., 10a Acton St., Gray's Inn Rd., W.C.1. (22453)

"Norvic" pads, makers of? K.E.—Denhams (Nch) Ltd., Woodhouse Rd., Todmorden, Lancs. (22459)

The above are selected from questions we have answered this week. If you have a query, send it to us.

figure for the month of December, 1951.

Change of Address. Work carried on at the Allesley, Coventry, works of Peerless and Ericsson, has been transferred to the firm's works at Factory Centre, King's Norton, Birmingham 20.

Factory. Yesterday, Jan. 16, the large new fluorescent tubing plant of Chance Bros. Ltd., at Firhill, Glasgow, was opened by the Secretary of State for Scotland, Mr. James Stuart.

Licence. E.C.D. Ltd. announce that arrangements have been made for them to manufacture and sell under an exclusive licence in Great Britain, and on a non-exclusive basis in certain other territories, the tonnage ozone equipment of the Welsbach International, Inc. of Philadelphia, U.S.A.

New Factory. A new factory with a floor space of 22,500 sq ft on the Queenslie Industrial Estate, Glasgow, has been rented by Whipp and Bourne, Ltd.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
" "English" quality ...	176 10 0	
TIN (99·99·75%) ... ... (Cash)	962-964	—
" (3 months)	963½-964	—
ALUMINIUM, commercial purity (del.)	148 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

G. E. Bell Ltd., 173 Earls Court Rd., S.W.5. Importers, exporters and manufacturers of and dealers in electrical goods, wireless and television sets, etc. Cap.: £1,500. Dirs.: G. E. Bell and Sarah Bell.

Norman H. Benson (England), Ltd., National Provincial Bank Chambers, Scott St., Keighley. Designers and manufacturers of mechanical, electrical and general engineering equipment, etc. Cap.: £5,000. Dirs.: J. Lund and Mrs. W. M. Lund, K. Von Drehnen and Mrs. V. T. K. Von Drehnen.

Cable Improvements Ltd., Broadmead House, 21 Panton St., S.W.1. To acquire and use patent rights, brevets d'invention, concessions, etc; to carry on business of manufacturers of and dealers in electrical appliances, engineering products, radio, radar and television equipment, cables etc. Cap.: £1,000. Chairman and Managing dir.: B. Zucker.

Carter Thermal Industries Ltd., 14 Park Rd., Solihull, Warwicks. General engineers, dealers in and manufacturers of refrigerators, etc. Cap.: £10,000. Dirs.: J. Carter and J. C. Anson.

Ipsophone of Great Britain Ltd. Making, selling, hiring out, installing and maintaining telephonic, recording, electrical and electronic apparatus and equipment, etc. Cap.: £6,000. Dirs.: to be appointed by subs. Subs.: Betty Wilson, and J. M. Crossman.

Miller and Peters (Electrical Contractors), Ltd., 154 Stoke Newington Church St., N.16. Cap.: £1,000. Dirs.: D. C. Miller and L. Peters.

C. J. Oakford Ltd., Rose Cot, Main Rd., Westcott, Dorking, Surrey. To take over business of an electrical engineer and contractor carried on at Westcott, Dorking, by Cecil J. Oakford. Cap.: £1,500. Dirs.: C. J. Oakford and Emily M. J. Oakford, V. S. C. Cooke and J. H. Fuller.

Smith and Quelch Ltd., 219a, Kensington High St., W.8. Precision, mechanical, electrical, motor, wireless and radio engineers and contractors, etc. Cap.: £1,000. Dirs.: F. C. Smith and H. G. Jacobs.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Comuniphone Ltd. First and final dividends of 2s. 1d. payable today (Thursday) at 19 Eastcheap, E.C.3.

Corwen Electric Light Co. Ltd. Meeting of members will be held at Council Offices, Westbourne Terrace, Bridge St., Corwen, on Feb. 15 at 11 a.m., to receive liquidator's report.

Electrical and Associated Services (Mumbles) Ltd. Meeting of creditors is to take place at Y.M.C.A. Buildings, Kingsway, Swansea, on Jan. 31 at 11.30 a.m., to receive full statement of company's affairs.

Electrical and Radio Installations (Ealing) Ltd. Liquidator appointed is John Basil Clifford, 4 Bucklersbury, E.C.4, with committee of inspection.

Wellgale Electrical Co. Ltd. Meeting of creditors will be held at W. H. Cork, Gully and Co., 19 Eastcheap, E.C.3, on Jan. 23 at 2.30 p.m.

Wiltshire Bros., radio and electrical retailers of S. Harrow. Partnership between Edward K. Wiltshire and Phillip J. Wiltshire, dissolved as from July 31 last. Debts received and paid by P. J. Wiltshire.

BANKRUPTCY ACTS

First Meeting

Sunderland. John Renwick Short, electrical contractor trading at 11 Rutland Ave., Bishop Auckland. First meeting today (Thursday) at Official Receivers' Office, Gibb Chambers, 54 Westgate Rd., Newcastle, 11 a.m. Public examination at County Court, John St., Sunderland, on March 12 at 10.30 a.m.

Application for Discharge

Salford. Wilfrid E. Lawton, trading as Lawton Bros., dealers in refrigeration equipment at 36 Lower Broughton Rd., Salford. Hearing fixed for Feb. 25 at Court House, Enscombe Place.

Intended Dividends

Birmingham. Arthur Fielder, trading as "A. Fielder and Co.", radio and electrical dealer, at 314 Shortheath Rd., Erdington, and 4 Cooksey Lane, Erdington. Last day for receiving proofs, Jan. 23. Trustee is R. K. Clark, Official Receiver, Somerset House, Temple St., Birmingham.

Dividend

Edmonton. John Leslie Rose, electrical engineer, of 9 Wades Hill, Winchmore Hill, N.21. First and final dividends of 3s. 11½d. in £ payable at Official Receiver's office, 3 Central Buildings, Matthew Parker St., S.W.1, on Jan. 24.

BUSINESS PROSPECTS

HOME

Ayr. Dean of Guild Court has approved erection of 50 houses at Dalmilling.

Ballyclare U.D.C. Erection of 78 houses and flats on Charles Drive site. Houston and Beaumont, Architects, 6 Union St., Lurgan.

Banbury. B.R. has approved the rebuilding of railway station.

Barking T.C. Twenty-six flats to be built in Blake Ave.

Benfleet (Essex) U.D.C. Parklands estate is site for further 31 houses.

Barnard Castle R.D.C. Erection of 34 houses at Etherley and 26 at Evenwood. Architect is J. Lawton, 45 Galgate.

Bideford T.C. Construction of 28 houses in Pyne's Lane.

Blackwell (Notts) R.D.C. Allocation of 170 houses received for 1952, as well as 160 houses for miners.

Bootle T.C. Erection of grammar technical school on New Park Farm site. W. A. Harrison, Borough Surveyor, Town Hall.

Bristol. It is proposed to build a clinic in Claremont St. at estimated cost of £31,191.

Cardigan T.C. Scheme approved for erection of 100 houses near Greenland Meadows and 15 at St. Dogmaels.

Coleraine R.D.C. Plans approved for erection of 24 houses at Kilrea and 18 at Castlerock for N. Ireland Housing Trust.

Corby U.D.C. Erection of two blocks of shops on new housing estates at estimated cost of £68,000. Architect, Council Offices. Plans also in hand for construction of 294 houses on site No. 1, 50 at Lodge Park and 80 flats in Coltingham Rd.

Coulsdon and Purley U.D.C. Allocation of 150 houses received for 1952.

Cuckfield U.D.C. A total of 52 dwellings to be built on three sites.

Dagenham T.C. Sixty-six flats to be built in Eastern Ave. Council granted provisional allocation of 200 houses for this year.

Darlington T.C. Application to be made for sanction to borrow £64,288 for erection of 46 houses on Springfield estate.

Edinburgh. Dean of Guild Court has approved the site preparation for 220 houses at Liberton.

Egham. Approval received for construction of administration block at county secondary school. Estimated cost, £40,000.

Felling (Dur.) U.D.C. A further 80 houses to be built on Ellen Wilkinson estate. H. Fawcett, Council Offices, is Surveyor.

Glasgow. E.C. has approved the rebuilding of two further-education colleges at cost of £840,000.

Golborne (Lancs). U.D.C. to apply for sanction to borrow £55 258 for erection of 40 houses on Derby Rd. site.

Gt. Yarmouth T.C. It is proposed to build old people's hostel in Caister Rd., junior school on Magdalen College estate, and primary school in Lawn Ave.

Grimsby T.C. Application to be made for sanction to borrow £'70,000 for second part of College for Further Education, £140,640 for Chelmsford Ave. secondary school, and £44,760 for Western primary school.

Guildford T.C. Allocation of 200 houses received for this year. Tenders expected to be invited shortly for erection of 116 houses at Bushey Hill.

Hackbridge (Surrey). Extensions to Elmwood county secondary school, to cost some £17,010, have been approved.

Hampshire. Erection of primary school at Christchurch. County Architect, The Castle, Winchester.

Harrow. It is proposed to build junior and infants' schools at Pinner.

Hawick. Dean of Guild Court has approved erection of 80 houses in Burnfoot scheme for Scottish Special Housing Association Ltd.

Horsham R.D.C. Tenders to be invited for construction of 40 houses at Crawley. This year's allocation comprises 120 houses.

Lanchester R.D.C. Erection of 64 houses. Surveyor is J. A. Routledge.

Liverpool. Council recommended to apply for sanction to borrow £6,214 for rewiring St. John's Market.

Lowestoft T.C. Erection of 22 dwellings on Gunton estate. Borough Engineer, Town Hall.

Manchester. Approval received for modernisation of wards at Withington Hospital.

Marshland (Norfolk) R.D.C. Erection of 52 dwellings on various sites. Council's Architect, Council Offices, Alexandra Rd., Wisbech.

Meriden (Warks) R.D.C. Construction of 52 houses at Arley. Engineer and surveyor, B. H. Stephenson, The Old Vicarage, Coleshill.

Middlesbrough. Kitching and Co., 21 Albert Rd., have prepared plans for factory, office and store in Commercial St. for R. Sowerby. Provisional allocation of 335 houses granted for 1952.

Newcastle-on-Tyne. Ministry approved £315,000 scheme for erection of multi-storey block of flats in Hindhaugh St.

Newcastle-on-Tyne. Tenders likely to be invited soon for erection of 1,000 flats in Benton Lane. George Kenyon, City Architect, 18 Cloth Market.

Northumberland. E.C. is to spend £2,710 on installing electricity at Hexham grammar school.

Northumberland. Tenders expected to be invited shortly for erection of £109,000 Newburn West Denton primary school. Also works additions are contemplated at Prudhoe Works of I.C.I. Ltd. costing hundreds of thousands of pounds.

Nuneaton. It is proposed to extend factory in Seymour Rd. of Glazier Leaper and Co.

Oswaldtwistle U.D.C. Construction of 27 houses on Grove St. estate. T. D. Manning, Engr. and Surveyor, Town Hall.

Paignton U.D.C. Tenders to be invited for erection of 84 flats and 42 houses at Foxhole estate.

Peterborough. It is proposed to build 34 shops—15 on Mountsteven Ave. estate. Architect and Surveyor, Town Hall.

Peterborough. Erection of 90 houses on Dogsthorpe North estate. City Engineer and Surveyor, F. J. Smith, Town Hall.

St. Faith's and Aylsham (Norfolk) R.D.C. Erection of 46 houses on four sites. Architect, F. M. Dewing, 40 Prince of Wales Rd., Norwich.

Scunthorpe. Work to be started soon on £200,000 Westcliffe secondary school. Lindsey, C.C. Architect, Council Offices, Lincoln.

South Shields T.C. Approval granted for building of block of flats in Wellington St.

Stafford T.C. Erection of five blocks (60) of flats on Rising Brook estate has been approved.

West Hartlepool T.C. Estimate approved for erection of 28 houses on Owton Manor estate and £2,190 is to be spent on conversion of "The Firs" into children's hostel. Also fresh tenders are to be invited for electrical work at Dinsdale Lodge.

Weymouth T.C. Erection of 24 flats in six blocks on Downclose estate. Borough Engineer and Surveyor, 6 Pulteney Buildings.

Wicklow. Application to be made for sanction to borrow £30,000 for erection of technical school at The Glebe.

Wigan. Approval granted for provision of physiotherapy and rehabilitation department at Wigan Infirmary.

OVERSEAS

India. Development Commissioner of Uttar Pradesh is making enquiries into the types of equipment suitable for small hydro-electric schemes of 20/200 kW in the hill areas. He wants to receive information from U.K. firms able to supply such equipment. Communications should be sent to U.K. Trade Commissioner, P.O. Box 9077, 1 Harrington St., Calcutta 16, for transmission to above.

Lebanon. M. Nsouli and Fils, of P.O. Box 297, Beirut, Lebanon, want to establish trading relations with U.K. manufacturers of electric heaters, cookers and stoves, washing machines, refrigerators, irons and other appliances.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Autovox. 696,345. Class 9. Radio and television apparatus, etc. Industria Radio-Techica Italiana, Largo Ponchielli N.6, Rome, Italy.

PI in design 696,808. Class 7. Hydro extractors and centrifugal clutches. Power Installations Ltd., Tudor Works, Bradgate St., Leicester.

"Skantic," with design. 694,844. Class 9. Accumulators, transformers, apparatus for electrifying fences, record changers, etc. Industriak - Tiebolaget Luxor, Motala, Sweden.

Yoder. 701,815. Class 9. Electrical welding apparatus, electrodes, etc. Yoder Co., 5,500 Walworth Ave., Cleveland 2, Ohio.

MEETINGS TO NOTE

THURSDAY, JAN. 17

I.E.E. (W. Wales Sub-centre).—Chairman of Western Centre's address, by J. W. Elliott. Central Public Library, Swansea, 6 p.m.

I.E.E. (Irish Branch).—"Protection of Electrical Power Systems." H. Leyburn and C. H. W. Lackey. Trinity College, Dublin, 6 p.m.

FRIDAY, JAN. 18

I.E.E. (N.E. Students' Section.)—Problems Night. Crown Hotel, Clayton St., Newcastle.

ENGRNG. LEGAL SOC.—Dinner address: "The Expert Witness." Mr. Justice Sellers. Holborn Restaurant, W.C.2, 6 p.m.

MONDAY, JAN. 21

I.E.E. (London). — Discussion on "Implications of Railway Electrification Committee's Report, 1950," opened by C. M. Cock. Savoy Pl., 5.30 p.m.

I.E.E. (Mersey and N. Wales Centre). — "Inhibited Transformer Oil." W. R. Stoker and C. N. Thompson. Liverpool Royal Instn., Colquitt St., 6.30 p.m. ...

I.E.S. (Sheffield Centre).—"Stage Lighting." P. Corry. Surrey St. Library, 6.30 p.m.

BIRMINGHAM ELECTRIC CLUB.—"Electrical Engineering in Plating Industry." W. F. Baker. Grand Hotel.

A.S.E.E. (Kent Branch).—"Cold Cathode Lighting." G. Singleton. Royal Star Hotel, Maidstone, 8 p.m.

I.E.E. (London Utilisation Section).—"Domestic Electrical Installations: Some Safety Aspects." H. W. Swann. Savoy Pl., 5.30 p.m. (Date changed from Jan. 24.)

I.E.S. (Gloucester and Cheltenham Centre).—"Lighting on the *Queen Elizabeth* and the *Caronia*." T. Catten. G.E.C. Ltd., St. Aldgate St., Gloucester, 6.15 p.m.

I.E.S. (Leicester Centre).—Film and discussion evening at M.E.B., Charles St., 6.30 p.m.

E.P.E.A. (Merseyside Tech. Group). — "Historical Development of Power Cables—Special Reference to Paper - insulated Cables." J. Temple Hazell. Electricity Showroom, Whitechapel, Liverpool, 7 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"Measurement of Interlaminar Resistance of Varnish-Insulated, Silicon-Steel Sheet for Electrical Machines." E. D. Taylor. King's College, Newcastle, 6.15 p.m.

I.E.E. (Western Supply Group).—"Variable-Voltage Generation Applied to A.C. Systems." R. L. Chatrill. Elect. House, Colston Avenue, Bristol, 6 p.m.

TUESDAY, JAN. 22

I.E.E. (London Measurements and Supply Section).—Discussion on "High-voltage Measurements and Tests," opened by J. S. Forrest and H. Tropper. Savoy Place, 5.30 p.m.

I.E.E. (N. Midland Utilisation Group).—Three papers provided by N. Midland Students' section. 24 Aire St., Leeds, 6.30 p.m.

I.E.E. (N.W. Utilisation Group). —"New Power Stroboscope for High-Speed Flash Photography." W. D. Chesterman, D. R. Clegg, G. T. Peck and A. J. Meadowcroft. Engrs. Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (Scottish Centre).—"Development and Design of High Voltage Impulse Generators." F. S. Edwards, F. R. Perry and A. S. Husbands. 39 Elmbank Cres., Glasgow, 7 p.m.

WOMEN'S ENGRNG. SOC. (Manchester Branch).—"Transformers." J. D. Hodgetts. Engineers' Club, Albert Sq., 6.30 p.m.

WEDNESDAY, JAN. 23

A.S.E.E. (Coventry Branch).—"Servicing Fluorescent Lamps." W. A. R. Stoyle. Coventry Tech. College, 7.15 p.m.

I.E.E. (London Education Circle). —Discussion on "Essentials of a First Course in Electricity and Magnetism." H. Kayser, Savoy Place, W.C.2, 6 p.m.

I.E.E. (Southern Centre).—"Electrical Properties of Nerve and Muscle." Dr. W. E. Floyd. R.A.E. College, Farnborough, 7.30 p.m.

I.E.S. (London).—"Papier Mache." Magnet House, Kingsway, W.C.2, 6 p.m.

I.E.S. (London).—Informal Meeting. Discussion on the "Preparation of a Technical Paper." 6 p.m.

I.E.E. (N.E. Students' Section).—"Engineers' Place in the Atomic Energy Project." T. W. Berrie. Cleveland Scientific and Technical Inst., Corporation Rd., Middlesbrough, 6.30 p.m.

THURSDAY, JAN. 24

I.E.S. (Bradford Group).—"Church Lighting." L. C. Retting. Y.E.B., Sunbridge Rd., 7.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Birmingham Branch). —"Practical Aspect of Heating and Ventilating." Imperial Hotel, 6.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (London Assoc. Members and Graduates).—"Fuels and Firing Appliances." E. G. Ritchie. 39 Victoria St., S.W.1, 6.30 p.m.

The design of HENLEY Cablegrip type Boxes is based on years of experience of practical jointing conditions, and incorporates many features which facilitate jointing operations.
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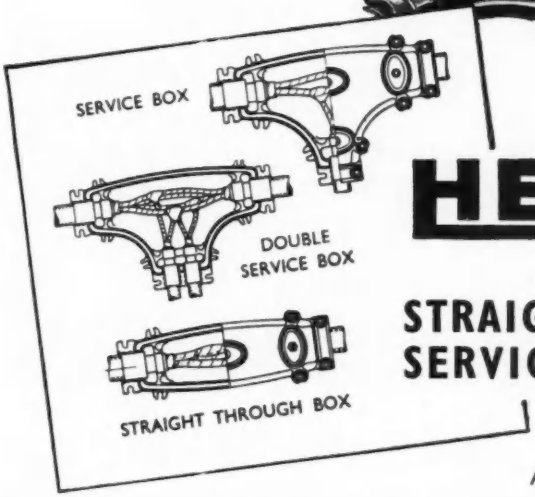

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED - FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

DENBIGHSHIRE EDUCATION AUTHORITY

Proposed New Girls' Grammar School at Ruabon, Near Wrexham

TO ELECTRICAL CONTRACTORS

CONTRACTORS desirous of submitting a tender for the following works, viz. Electrical Installation, tender based on plans and specification, are invited to forward their names, together with a deposit of £3 3s. (three guineas) (which will be returned on receipt of a bona fide tender), to Mr. G. D. Wiles, County Architect, Grove Park, Wrexham, not later than Tuesday, January 29, 1952.

No application to tender will be accepted after this date.

The deposit cheque is to be made payable to the "Denbighshire Education Authority," and crossed "Midland Bank, Ltd."

The specification and plans will be despatched to contractors desirous of tendering on or about February 7, 1952, and tenders will be required not later than February 18, 1952.

Contractors will be required to provide proof that they have the organisation and necessary labour to carry out this work.

The lowest or any tender will not necessarily be accepted, nor will any allowance be made for estimates

W. E. BUFTON,
Clerk to the County Council.

County Offices, Ruthin.
January, 1952. (P 682)

COUNTY BOROUGH OF MERTHYR TYDFIL

Electrical Installation of Schools

TENDERS are invited for the provision of electrical installations, wiring to be with thermo-plastic cables, drawn into steel conduits, together with all necessary fittings, switches, etc., to the following schools :—

Caedraw Junior Mixed and Infants
Queens Road Infants
Pant Infants
Dowlais Infants

It will be conditional upon the successful contractor to carry out installations in all schools simultaneously.

Forms of tender, specifications and plans will be forwarded upon application. A deposit of two guineas, returnable to bona fide tenderers, or upon the return of the documents seven days before the closing date of the advertisement, must accompany the application.

Conditions of Contract may be inspected during the usual office hours, at the Borough Engineer's Department, Town Hall, Merthyr Tydfil.

Tenders, in envelopes to be provided, must be delivered to the undersigned not later than Thursday, February 14, 1952.

The Council does not bind itself to accept the lowest or any of the tenders.

T. S. EVANS,
Town Clerk.

Town Hall,
Merthyr Tydfil,
January 8, 1952. (P 629)

COUNTY BOROUGH OF MERTHYR TYDFIL

Electrical Installation of Schools

TENDERS are invited for the provision of electrical installations, wiring to be with thermo-plastic cables, drawn into steel conduits, together with all necessary fittings, switches, etc., to the following schools :—

Pentrebach Infants
Edwardsville Junior Mixed and Infants
Woodlands Junior Mixed and Infants
Brecon Road Infants
Merthyr Roman Catholic School.

(*Continued in next column*)

(*Continued from previous column*)

It will be conditional upon the successful contractor to carry out installations in all schools simultaneously.

Forms of tender, specifications and plans will be forwarded upon application. A deposit of two guineas, returnable to bona fide tenderers, or upon the return of the documents seven days before the closing date of the advertisement, must accompany the application.

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Tenders, in envelopes to be provided, must be delivered to the undersigned not later than Thursday, February 14, 1952.

The Council does not bind itself to accept the lowest or any of the tenders.

T. S. EVANS,
Town Clerk.

Town Hall,
Merthyr Tydfil.
January 8, 1952. (P 628)

CITY OF BELFAST

Electricity Department

VICTORIA POWER STATION

TENDERS are invited for the supply, delivery and erection of one bulldozer having a nominal capacity of 120 tons of coal per hour for a mean haul of 140 ft and a minimum horsepower of 100 for the engine.

Form of tender, conditions and specification, in quadruplicate, may be obtained from Messrs. Merz and McLellan, consulting engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the contract documents may be obtained at three guineas each; this sum will not be returnable. (Cheques should be made payable to the Belfast Corporation Electricity Department.)

Each tender, in quadruplicate, in sealed envelope marked "Tender for Mobile Coal Moving Equipment, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, February 15, 1952.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
January 11, 1952. (P 685)

BOROUGH OF HENDON

STREET LIGHTING EQUIPMENT

THE Borough Council invites tenders for the supply and delivery only of reinforced concrete lamp columns, 25 ft to light source, required in connection with the improved lighting of a section of North Circular Road, from Brent Cross to Edgware Road.

Form of tender, specification and bill of quantities may be obtained on application to Mr. A. O. Knight, M.C., M.Inst.C.E., Borough Engineer and Surveyor, Town Hall, Hendon, N.W.4, on receipt of a deposit of £2 2s., which will be returned on receipt of a bona fide tender on the form provided and subject to the conditions of tender.

In the case of the accepted tender, the deposit will be returned on the execution, when required, of the contract and bond; failing such execution as aforesaid, the deposit will be forfeited.

Tenders endorsed "Contract Works No. E.12.62/40" are to be forwarded in the envelope provided, not later than 10 a.m., on February 4, 1952, and the envelope shall not bear any name or marking indicating the sender. Tenders received after this date and time will not receive consideration.

The Corporation does not bind itself to accept the lowest or any tender.

Dated this 10th day of January, 1952.

LEONARD WORDEN,
Town Clerk.

Town Hall, Hendon, N.W.4. (P 684)

BOROUGH OF HENDON

STREET LIGHTING EQUIPMENT

THE Borough Council invites tenders for the supply, delivery and installation of open-type lanterns for 140-watt sodium lamps, together with transformers, condensers and other ancillary equipment, including all necessary wiring, required in connection with the improved lighting of a section of North Circular Road from Brent Cross to Edgware Road.

Form of tender, specification and bill of quantities may be obtained on application to Mr. A. O. Knight, M.C., M.Inst.C.E., Borough Engineer and Surveyor, Town Hall, Hendon, N.W.4, on receipt of a deposit of £2 2s., which will be returned on receipt of a bona fide tender on the form provided and subject to the conditions of tender.

In the case of the accepted tender, the deposit will be returned on the execution, when required, of the contract and bond: failing such execution as aforesaid, the deposit will be forfeited.

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The Corporation does not bind itself to accept the lowest or any tender.

Dated this 10th day of January, 1952.

LEONARD WORDEN,
Town Clerk.

Town Hall, Hendon, N.W.4. (P 683)

CITY OF MANCHESTER

STREET LIGHTING EQUIPMENT

THE City Council is prepared to receive tenders for the supply of the following items during the year ending December 31, 1952:—

(a) Top or side entry bowl refractor lanterns suitable for 80/125 watt h.p.m.v. lamps.

(b) Sets of auxiliary equipment for 125 watt h.p.m.v. lamps.

Forms of tender may be obtained on application to the City Surveyor (Room 529), Town Hall, Manchester 2, and completed tenders must be returned to the Chairman of the Highways Committee not later than 10 a.m. on Wednesday, February 6, 1952.

The Corporation does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall,
Manchester 2.
January 16, 1952. (P 627)

APPOINTMENTS VACANT

CROWN AGENTS FOR THE COLONIES

DEPUTY POWER STATION SUPERINTENDENT required in connection with the Central Electrification Scheme in Cyprus, for two tours each of two years with prospect of permanency. Salary according to qualifications and experience in the scale £960 rising to £1,200 a year. Cost of living allowance at present 10 per cent. of salary. Free passages and quarters. Liberal leave with full salary. Candidates should have had a good technical education and considerable practical experience in the operation, maintenance and administration of a modern generating station equipped with oil-fired boilers. A knowledge of high tension switchgear is also essential. Preference will be given to candidates who are Corporate Members of either the Institution of Electrical Engineers or the Institution of Mechanical Engineers.—Apply at once by letter, stating age, full names in block letters and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter "M.29060B." The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 660)

GOVERNMENT OF IRAQ

ELECTRICAL SHOP MANAGER required by the Iraqi State Railways for one tour of 3 years in the first instance. Salary: Iraq dinars 100 a month (I.D. 1—£1). High cost of living allowance between I.D. 10 and I.D. 14 a month, according to dependents. Free passages. Liberal leave on full salary. Candidates, under 45 years, must have had sound manufacturing experience in a large manufacturing works and should be capable of instructing staff in general electrical motor repairs and re-winds. Experience in the maintenance of Electrical Plant in a large works would be an advantage.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents, 4 Millbank, London, S.W.1, quoting on letter "M.29027.B." The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 658)

BRITISH ELECTRICITY AUTHORITY

(South Western Division)

SENIOR ASSISTANT ENGINEER
Generation (Operation) Department

APPLICATIONS are invited for the superannuable appointment of Senior Assistant Engineer in the Generation (Operation) Department at Divisional Headquarters, Bristol.

Applicants should possess good technical qualifications and have had practical experience in investigational and project work, preferably in generating stations.

The successful candidate will be responsible for co-ordinating work on the engineering and economical aspects of generating station operation.

The salary and conditions of service will be in accordance with the N.J.B. Agreement, Grade 1, Class "AX/CX" (£945-£1,07d/£1,119-£1,141 per annum).

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity House, 26 Oakfield Road, Bristol 8, to be received by January 28, 1952.

R. C. BARRETT,
Divisional Secretary.

January 8, 1952. (P 649)

BRITISH ELECTRICITY AUTHORITY

(Eastern Division)

APPLICATIONS are invited for the following appointments:—

JUNIOR ENGINEERS
Little Barford Generating Station.

Salaries in accordance with Clause 35 of the Revised National Joint Board Schedule "A," Class "G," Grade 16 (£375) to Grade 14 (£471) per annum, depending upon qualifications.

Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience, and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than January 26, 1952. Envelopes should be endorsed "Junior Engineers—Little Barford."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 648)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

ASSISTANT MAINTENANCE ENGINEER (Electrical or Mechanical)
Brighton "B" Power Station

HIGHER NATIONAL CERTIFICATE or equivalen qualification preferred, and experience in the maintenance of either modern high-pressure turbine and boiler plant auxiliaries or alternators, e.h.t. switchgear, motors and all power-station electrical and auxiliary plant. Class "J," Grade 9, £699 per annum.

ENGINEERING DRAUGHTSMAN (Civil)
Divisional Headquarters

Higher National Certificate preferred, and experience in design of reinforced concrete and steel structures, foundations and power-station layout and construction. Commencing salary, £438 per annum. Schedule "D," Grade 6.

N.J.B. conditions of service for both positions.

Apply by January 28, 1952, on forms obtainable from British Electricity Authority, South Eastern Division, Lower Ham Road, Kingston-upon-Thames. (P 665)

BRITISH ELECTRICITY AUTHORITY

South Western Division

STATION SHIFT CONTROL ENGINEER
Exeter Generating Station

APPLICATIONS are invited for the superannuable position of Station Shift Control Engineer at Exeter Generating Station.

Applicants should possess good technical qualifications and have had training and experience in the control and operation of steam generating plant and main switch gear.

N.J.B. conditions of service. Salary: Class "D," Grade 10, £511-£527 p.a.

Applications, stating age, qualifications, experience present appointment and salary, should be addressed to the Divisional Secretary, British Electricity House, 26 Oakfield Road, Bristol 8, to be received by January 31, 1952.

R. C. BARRETT,
Divisional Secretary.

January 11, 1952. (P 689)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 1 52

APPLICATIONS are invited for the following superannuable appointments. Conditions of service and salaries will be in accordance with the National Joint Board Agreement.

(1) SECOND ASSISTANT ENGINEER (Mechanical) Construction Department Headquarters. AX/CX—Grade 2 (£803—£1,000).

Applicants must be Corporate Members of the Institution of Mechanical or Electrical Engineers, preferably have experience in Power Station construction, be able to make investigations, prepare schemes and specifications for new projects.

(2) THIRD ASSISTANT ENGINEER (Mechanical) Construction Department Headquarters. AX/CX—Grade 5 (£629—£810).

Applicants must possess the H.N.C. or equivalent, have works and drawing office experience and will be required to assist the Second Assistant Engineer as above.

(3) ENGINEERING DRAUGHTSMAN (Construction) Department, Newport Power Station. D.6 (£413—£547).

Preference will be given to candidates who hold the H.N.C. or equivalent and they should have previous drawing office experience in connection with electrical plant. A knowledge of electrical installations and layouts would be an advantage.

(4) ENGINEERING DRAUGHTSMAN (Electrical), transmission Department Headquarters. D.6 (£413—£547).

Candidates should have general drawing office experience and a knowledge of wiring diagram work will be an advantage. Preference will be given to candidates who, possess the H.N.C. or equivalent.

(5) JUNIOR ENGINEERS at various power stations. Salaries commencing at £375 p.a. Applicants should preferably have received a manufacturing works training and be in possession of the H.N.C. (electrical or mechanical).

Application forms, obtainable from the Divisional Secretary at the address below, should be returned by January 31, 1952.

H. J. BENNETT,
Divisional Controller.

The British Electricity Authority,
Cardiff (Pengam Moors) Airport,
Cardiff. (P 631)

CITY COUNCIL OF BLOEMFONTEIN (SOUTH AFRICA)

VACANCY IN POWER STATION FOR FITTER AND TURNER

APPLICATIONS are invited from fully qualified fitters and turners, with thorough experience of the care and maintenance of steam-generating plant, turbo-alternators, pumps and other power-station equipment, to fill a vacancy at the Bloemfontein Power Station on the following terms:—

Salary scale, £420 by £20 to £480 per annum, plus temporary cost-of-living allowance, at present £202 per annum for married persons, plus £7 per annum for each child, and £109/4/- per annum for single persons.

Four weeks' vacation leave is granted annually, and after each period of six years' continuous and satisfactory service, 30 days' bonus leave. Six weeks on full pay within a cycle of twelve months and six weeks on half pay within a cycle of twelve months is paid for sick leave.

The successful applicant will be required to contribute to the Orange Free State Joint Municipal Pension Fund and Sick Fund, and become a member of the South African Association of Municipal Employees (Bloemfontein Branch) and its Provident Fund.

The successful applicant will have to pay his own sea passage to Cape Town and fail fare from Cape Town to Bloemfontein.

Applications, accompanied by copies of testimonials, should reach the undersigned on or before February 2, 1952. There is no special form of application.

DAVIS AND SOPER LTD.,
Agents to the City Council of Bloemfontein.
52 and 54 St. Mary Axe, London, E.C.3.
January 7, 1952. (P 650)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above position in the City District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least Higher National Certificate standard, preferably being corporate members of the I.E.E., and possess a practical experience of all branches of engineering work associated with the organisation of a district distribution department, particularly in regard to mains and substation work, on both a.c. systems (single- and three-phase) and d.c. systems.

The post is graded under Schedule "A" of the National Joint Board agreement as Class "E," Grade 7, £660/9/- per annum, rising to £693 per annum, inclusive of London allowance.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned completed by January 28, 1952. Please enclose addressed foolscap envelope and quote Ref. V/1403/T. (P 686)

CIVIL SERVICE COMMISSIONERS

PROFESSIONAL ENGINEERS IN GOVERNMENT DEPARTMENTS

THE Civil Service Commissioners announce an Open Competition to be held during 1951-52 for permanent appointments in many departments of the Civil Service for a wide variety of engineering duties. Applications will be accepted at any time but not later than March 31, 1952, and selected candidates will be interviewed as soon as possible after the receipt of their application forms. Candidates are advised to apply as early as possible.

Age limits. Candidates must be under 35 on November 30, 1951, with extension for regular service in H.M. Forces and for established Civil Service. For appointments in the Post Office they must be 21 or over, in the Ministry of Supply, 23, and in all other departments 25 or over on that date.

Minimum qualifications vary for different posts. Generally a university degree in engineering or Corporate Membership of the Institutions of Mechanical Engineers, Electrical Engineers or Civil Engineers, or passes in or exemption from Sections A and B of the corresponding Associate Membership examinations, or evidence of exceptionally high professional attainment are required. For certain posts, Corporate Membership of the Institute of Fuel by examination or the Institution of Chemical Engineers, or Graduate Membership of the Institution of Chemical Engineers, or Associate Fellowship of the Royal Aeronautical Society or an Honours Degree in Physics will be accepted instead.

The salary on appointment will be fixed according to age. The salary for men aged 25 in London is £575 rising by annual increments of £ 5 to £750, and by £30 to £900. Salaries for women and for posts outside London are lower. There are prospects of promotion to higher grades on scales for men in London of £900-£1,200, £1,250-£1,450 and above.

Further particulars and application forms from Secretary, Civil Service Commission, Trinidad House, Old Burlington Street, London W.1, quoting No. S35/51. (P 652)

ADMIRALTY

TECHNICAL Class Grade III vacancies exist in the Naval Ordnance Inspection Department for staff with knowledge of electronics. The posts are mainly in the London area and the duties involve acceptance tests and inspection of electronic equipment at manufacturer's works.

Candidates must be British subjects at least 25 years of age and should have served an apprenticeship or had equivalent workshop training, followed by experience in the manufacture of electric and electronic equipment. Possession of Ordinary National Certificate, preferably in telecommunications, or an equivalent City and Guilds Certificate, is desirable.

Appointments will be temporary and unestablished. Opportunities may occur at a later date for qualified staff to secure established appointments which would carry possibilities of promotion to grades with higher salary scales.

The Technical Class Grade III salary scale for the London area is £460 by £20 to £575 per annum, and the point at which applicants will be entered within this range will depend on age, experience and ability.

Applications, stating age and details of technical qualifications, apprenticeship (or equivalent) and experience should be sent to the Inspector of Naval Ordnance, Middlegate House, Royal Arsenal, Woolwich, London S.E.18. Original testimonials should not be forwarded with application. Candidates required for interview will be advised within two weeks of receipt of application. (P 655)

AIR MINISTRY

AIR MINISTRY require MECHANICAL and ELECTRICAL ENGINEERS for duty in their Works Department in connection with the design, operation and maintenance of ground mechanical and electrical works services on R.A.F. stations at home and overseas and on civil aviation stations. Appointments will be in two grades with a salary of (1) £900 to £1,0 (D 1/48/A), or (2) £900 to £1,200 (D 370/50/A) respectively. Provincial rates are somewhat lower. Commencing salary will be in accordance with age, qualifications and experience. A special allowance of up to £300 a year is payable in addition to salary during overseas service. Candidates must be natural born British subjects. The minimum qualifications and experience required for both grades of post are: (i) (a) University degree or equivalent diploma in electrical and/or mechanical engineering and have had at least a two-year apprenticeship, or (b) Graduate or Corporate Membership of the Institution of Electrical Engineers, or of the Institution of Mechanical Engineers, with appreciable electrical engineering experience, and have served at least a three year apprenticeship, and (ii) have been employed in a responsible position for a minimum of three years with a well-established engineering concern, and there have gained wide experience in electrical and mechanical engineering practice.

Application forms from Ministry of Labour and National Service, Technical and Scientific Register (K), Almack House, 26 King Street, London S.W.1, quoting D 19/48-A or D 370/50-A. (P 654)

AIR MINISTRY

INVITE applications for non-pensionable appointments as STATION ENGINEERS in the Directorate General of Works at R.A.F. stations.

The salary rises to a maximum of £560 per annum and starting pay depends upon age, experience and qualifications. Annual increases will be granted for satisfactory service where salary is below the maximum.

Candidates, who should be natural born British subjects, should have suitable practical experience and possess the following qualifications:—

(a) Ordinary National Certificate in Electrical Engineering, or show that they have reached an equivalent standard of technical education;
(b) have served a recognised apprenticeship in electrical engineering with a firm or establishment of good repute;
(c) have had three years employment in electrical engineering, preferably on the operation and maintenance of mine, factory or workshop plant and services.

Preference will be given to applicants who, subsequent to (b) and (c), have had experience of supervising staff.

The work consists of the installation, operation and maintenance of high or medium voltage electrical distribution systems, electrical installations, steam and hot water heating system and miscellaneous works plant, tools and equipment.

Applicants should state if in addition to experience on above work, they have had responsibility for the maintenance and operation of Diesel engined generating plant.

Appointments to locations at or nearest to those specified in applications will be arranged as far as possible.

Applications stating age, qualifications and all previous appointments (with dates), to be addressed to the Air Ministry, Directorate General of Works (W.9), Bush House (S.E. Wing), Strand, W.C.2. (P 615)

ELECTRICITY SUPPLY COMMISSION

(Southern Rhodesia)

APPLICATIONS are invited for the following vacant posts on the permanent staff of the Electrical Department :—

The General Conditions of Service include a contributory pension scheme, Medical Aid Society, Holiday Fund; 45 days full-pay leave per annum, paid sick leave, initial sea and rail fares subject to agreement to remain in the service of the Electricity Supply Commission for a minimum of three years. In addition to the basic salaries at present a cost-of-living allowance of approximately 38% applies. Also, children and dependant allowances, where applicable. Appointment subject to medical examination and three months' probationary period.

INSTALLATION SECTION:

TECHNICAL ASSISTANT, Grade I.—Applicants must be A.M.I.E.E., between the ages 30 and 40 and with experience in operation and maintenance of indoor and outdoor substations from 11 kV up to 132 kV, with O.L.T.C., remote control and auto-reclosing switchgear. Salary scale: £693 x £31/10/- to £787/10/- p.a.

CONTRACTS SECTION:

TECHNICAL ASSISTANT, Grade I.—Applicants must be A.M.I.E.E., between the ages 30 and 40 and should be capable of drawing up specifications. Preference will be given to applicants who have had experience with consulting engineers. Salary scale, £693 x £31/10/- to £787/10/- p.a.

Applications, giving age, educational and technical training details and qualifications, subsequent experience in chronological order, nationality, marital state with number and age of dependants and enclosing copies of testimonials (which will not be returned) should be addressed to the Secretary, Electricity Supply Commission, P.O. Box 377, Salisbury, Southern Rhodesia, so as to arrive not later than February 20, 1952. (P 630)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT TO PURCHASING OFFICER

APPLICATIONS are invited for the post of Assistant to the Divisional Purchasing Officer at these Headquarters.

Applicants should have experience of buying maintenance supplies, general engineering and electrical equipment as required for generating stations and transmission sections, together with a sound knowledge of internal purchasing procedure, including trade inquiries, records, follow up, and the organisation of stores.

The salary will be in accordance with Grade 3 of the National Joint Council Agreement (£500-£560 per annum).

The post will be superannuable within the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, B.E.A., Barker Gate, Nottingham, and should be returned not later than February 4, 1952. Applicants who have previously applied for this position need not re-apply.

L. F. JEFFREY,
Divisional Controller.
January 11, 1952. (P 691)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified persons for the following positions:—

1/52 1st ASSISTANT CHEMIST, Avon Generating Station, Warwick.

2/52 1st ASSISTANT CHEMIST, Burton Generating Station, Burton-on-Trent.

Candidates should preferably possess the Higher National Certificate in Chemistry or its equivalent, and should have had practical experience in the analysis of coal, water, and oil, etc., insofar as they concern Power Stations.

The salary for the above appointments will be in accordance with Grade 9, Class "E" (£567-£579 per annum) of the N.J.B. Agreement, and the positions will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, Barker Gate, Nottingham, and should be returned not later than January 29, 1952. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(P 604)

BRITISH ELECTRICITY AUTHORITY

South Western Division

SHIFT CHARGE ENGINEER
Plymouth "A" Generating Station

APPLICATIONS are invited for the superannuable position of Shift Charge Engineer at Plymouth "A" Generating Station.

Candidates should have had good technical experience, a sound knowledge of the operation and maintenance of generating plant, and preference will be given to applicants possessing the Higher National Certificate or equivalent qualifications.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "F," Grade 7, £677-£696 per annum.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity House, 26 Oakfield Road, Bristol 8, to be received by January 28, 1952.

R. C. BARRETT,
Divisional Secretary.
January 10, 1952. (P 690)

MIDLANDS ELECTRICITY BOARD

Wolverhampton & District Sub-Area

APPOINTMENT OF DISTRICT ENGINEER
Walsall District

APPLICATIONS are invited for the above position in the Walsall District of the Wolverhampton and District Sub-Area.

Applicants must have had considerable experience in all branches of distribution work, including operation and maintenance of high- and low-voltage cables, overhead lines, substations, protective gear, etc. Appropriate technical qualifications will be considered an advantage.

The conditions of service will be in accordance with the National Joint Board Agreement, and the salary will be Class "F," Grade 3, £887-£925.

Applications, stating age, present salary, full particulars of qualifications, experience and present position, should be endorsed "District Engineer" and forwarded to Mr. F. J. Elliott, Sub-Area Manager, Midlands Electricity Board, 83 Darlington Street, Wolverhampton, within seven days.

A. STEPHENS,
Secretary.
January 9, 1952. (P 692)

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

REQUIRE SHIFT CHARGE ENGINEER for Bonnybridge Power Station Stirlingshire.

Applicants should preferably have experience in operation of turbo-generators, water-tube boilers and h.t. electrical plant. A knowledge of alternating current is essential. Certificated marine engineers would be considered.

Salary £677-£696 (N.J.B. Class "F/7). Pension scheme. Timber house available.

Apply by January 26, 1952, stating age and experience, to Divisional Controller, British Electricity House, Portobello, Midlothian. (P 688)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

BRITISH ELECTRICITY AUTHORITY

REQUIRE DEPUTY CHIEF ENGINEER (Research), responsible to Chief Engineer, for overall direction of research, with object of improving efficiency of generation, transmission, distribution and utilisation of electricity. Salary, £3,000 p.a. rising by £125 p.a. to £3,500 p.a. Contributory superannuation.

Applicants should have held responsible posts in research establishments closely related to the electricity supply industry, and preference will be shown for a candidate who can make effective contribution to the task of improving efficiency of generation.

Letters of application, stating age, qualifications, experience, present position and salary, together with the names of three referees, to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London W.1. Closing date, February 7, 1952. Please quote AE/226. (P 680)

BRITISH ELECTRICITY AUTHORITY

North Western Division

REQUIRES:—

Vacancy No. 653. ASSISTANT SHIFT CHARGE ENGINEER at Willow Holme Power Station, Carlisle. Salary £587-£609. (N.J.B. "F.9.")

Vacancy No. 654. STATION SHIFT CONTROL ENGINEER at Radcliffe Power Station, near Manchester. Salary £557-£578. (N.J.B. "F.10.")

Vacancy No. 655. GENERAL ASSISTANT ENGINEERS (Protection Section, Technical Department) in the Manchester Region, based at Cheadle, Cheshire. Salary, £481-£674. (N.J.B. "AX/DX.8.")

Vacancy No. 658. STATION SHIFT CONTROL ENGINEER at Greenhill Power Station, Oldham. Salary £535-549. (N.J.B. "E.10.")

Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before January 26, quoting vacancy No. (P 670)

SOUTH EASTERN ELECTRICITY BOARD

THREE FITTERS (ELECTRICAL)
Brighton and Hove District

WAGES 3/2½ per hour for a 44-hour five-day week under N.J.I.C. Agreement. Experienced in the erection and maintenance of electrical machines, h.v. and l.v. switchgear and transformers.

Applications, giving two referees, must reach E. H. Skinner, M.I.E.E., Brighton and Hove Manager, S.E.E. Board, Electric House, Castle Square, Brighton 1, by January 28, 1952.

CARTOGRAPHIC DRAUGHTSMAN
Croydon District

Salary £440 by £20 to £500 p.a., under N.J.C. Agreement, Grade 2, plus London Weighting. Superannuation will be arranged. Applicants should be suitably qualified and have responsible experience in a drawing office. The duties include the preparation of drawings in connection with sub-station layouts, cable records, etc.

Applications, giving two referees, must reach the Croydon Manager, S.E.E. Board, Electric House, Wellesley Road, Croydon, by January 28, 1952.

A. L. BURNELL,
Secretary.
January, 1952. (P 687)

YORKSHIRE ELECTRICITY BOARD

(No. 3 Sheffield Sub-Area)

APPLICATIONS are invited for the following appointment:—

GENERAL ASSISTANT DISTRICT ENGINEER
Maltby (Mexborough District)
(Vacancy No. 3/52)

Applicants should have a good general and technical education with practical training in an engineering workshop, or in the electricity supply industry. Experience in the construction, operation and maintenance of h.v. and l.v. underground and overhead distribution is necessary. Candidates should be prepared to reside in the district.

Salary, N.J.B. Agreement, Class "E," Grade 11, £504/£521 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, within fourteen days of the appearance of this advertisement. (P 657)

APPLICATIONS are invited for positions in the Radio Section of the Design Office of the G.E.C. Research Laboratories for work at Stanmore (Middx). Candidates must be capable of making first-class engineering drawings of sub-assemblies and fully dimensioned details of airborne radio and radar equipments for quantity production. Knowledge of Inter-Services specifications and standards would be an advantage. Special starting salaries will be given for outstanding ability.—Write to the Staff Manager (Ref. GBLC/418), Research Laboratories of The General Electric Co. Ltd., North Wembley, Middlesex, giving age, qualifications and experience. (P 679)

BRITISH CELANESE, LTD. require the services of an ASSISTANT ELECTRICAL ENGINEER, aged 28-35 years. Applicants should hold a university degree and/or be an associate of the Institution of Electrical Engineers: and having served a five years' indentured apprenticeship in the installation and maintenance of heavy electrical equipment in an oil refinery or large chemical factory. Professional experience is required relative to the design, construction and maintenance of extensive e.h.t. and l.t. cable networks, high-powered switchgear installations, automatic relay protective systems, multimotor control equipment and power and lighting installations for large chemical plants.—Replies to be addressed to: Appointments Officer, British Celanese Ltd., Spondon, Derby. (P 605)

CLERK (20-25, male or female) required to assist with accounts. Electrical contractors, West End.—Write, stating age, experience if any, and salary required, to Box H.945, Willings, 362 Gray's Inn Road, London W.C.1. (P 620)

COLLEGE GRADUATES with B.Sc. degree or Higher National Diploma in electrical engineering required for two-year apprenticeship course. Suitable applicants may be eligible for permanent position after completion. Special consideration given to applicants who have been demobilised from H.M. Forces.—State age, full details of scholastic training, to Personnel and Welfare Manager, Lancashire Dynamo and Crypto (Mfg.) Ltd., Trafford Park, Manchester 17. (P 647)

CONTRACTORS require OVERHEAD LINESMEN for work on h.t. and l.t. lines.—Write, stating experience, to Box No. 1381, Electrical Times. (P 656)

DRAUGHTSMAN required for contracts section, experienced on flat back and cubicle-type switchgear, and able to do diagrams. SWITCHGEAR DEVELOPMENT DRAUGHTSMAN also required, with experience on switchgear and motor control gear. Good salary offered for suitably qualified applicants. Pension scheme available.—Reply, stating age, salary and full details of technical qualifications and experience, to Erskine, Heap and Co. Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (P 671)

DRAUGHTSMEN, senior and junior. Experience on mercury-arc rectifiers or transformers desirable, but applicants having good electrical drawing-office experience will be considered.—Reply, stating age, experience and salary required, to Nevelin Electric Co. Ltd., Purley Way, Croydon. (P 565)

DRAWING AND TRACING, LTD., have vacancies for experienced SENIOR DRAUGHTSMEN and JUNIOR DETAIL DRAUGHTSMEN in their production drawing office, specialising in radio, electrical and mechanical engineering. 5-day week. Pension scheme. Good working conditions. Salary range £390-£533.—Write, stating age and experience, 456 Ewell Road, Surbiton, Surrey. (P 431)

ELECTRICAL DRAUGHTSMAN required, Birmingham area. Higher National Certificate. Age about 30. Preferably experienced in general installation work, including power and lighting in connection with large factory installations. A good salary will be paid to the right man.—State full particulars of age, experience and training to Box No. 1369, Electrical Times. (P 639)

ENGINEERS OR PHYSICISTS are invited to apply for positions in the following fields of work: (a) electronic circuitry, (b) servo-mechanisms, (c) d.c. amplifiers, (d) micro-wave aerials and transmitters, and (e) test gear for field trials. Work will be in experimental research and development teams at Stanmore (Middx.). Preference will be given to men with some experience and good qualifications.—Apply to the Staff Manager (Ref. GBLC/417), Research Laboratories of the General Electric Co. Ltd., North Wembley, Middlesex, giving age and record. (P 678)

GRADUATE ELECTRICAL ENGINEERS required to be trained as designers of electrical equipment for Diesel-electric locomotives. Practical workshop experience of manufacture and testing of this equipment preferred, together with good Honours Degree in electrical engineering. Age range 25-30 years. Good salary, prospects and facilities for advanced technical education. Excellent working conditions.—Please reply in confidence to Box No. 1375, Electrical Times. (P 642)

JUNIOR ELECTRICAL ENGINEER/DRAUGHTSMAN required by engineers in Bristol area. Must possess engineering degree or Higher National Certificate and be conversant with modern a.c. and d.c. industrial control and preparation of diagrams therefor. Knowledge of industrial electronics an advantage. Salary according to qualifications and experience.—Strachan and Henshaw, Ltd., Bristol 5. (P 644)

JUNIOR TECHNICAL ASSISTANT required in the sales office of a leading firm of rheostat manufacturers in Birmingham.—Write for interview, giving details of training and experience, Box No. 1371, Electrical Times. (P 640)

LARGE oil company requires for its overseas service an ELECTRICAL ENGINEER who would be responsible to Chief Electrical Engineer for installation of generating and distributing plant, switchgear, motors, etc., and operation/maintenance thereof. Applicants must have served a recognised apprenticeship and hold H.N.C. or equal. Single men not over 28 preferred. Attractive salary augmented by cost of living allowance, kit allowance, medical attention, pension fund, free furnished accommodation and passages.—Write, stating age, qualifications and full details of training and experience to Box No. E.T. 751, at 191 Gresham House, E.C.2. (P 684)

LARGE Scottish electrical contractors, carrying on work in all areas of Britain, are prepared to accept applications from ELECTRICAL ENGINEERS and kindred trades, men with experience in overhead transmission, erection survey design and draughtsmen, site engineers and linesmen, cabling engineers, electrical estimators and invoicing clerks, electricians and chargehands. Good prospects and superannuation scheme.—Apply, giving full particulars of qualifications, age and salary expected, to Box No. 1385, Electrical Times. (P 668)

LEADING AND SENIOR DRAUGHTSMEN required for transformer work of the largest class.—Apply by letter, quoting "Transformer" and giving full details of age, experience and salary required to Staff Manager, General Electric Co., Ltd., Witton, Birmingham 6. (P 595)

LIGHTING REPRESENTATIVE required for London area. Must possess sufficient sales ability to interest potential customers in large fluorescent installations. Must also have sufficient technical knowledge to enable him to initiate lighting schemes and discuss them in detail with lighting consultants, architects, etc.—Write, giving full particulars in confidence, to Box No. A.C. 68721, Samson Clarks, 57/61 Mortimer Street, London W.1. (P 643)

MECHANICAL ENGINEERS. Large engineering firm in Manchester require Mechanical Engineers with University Degree and conversant with servo mechanisms.—Apply in writing, stating age, qualifications, experience, etc., marking envelopes "Engineers," to Box No. 1321, Electrical Times. (P 502)

MINISTRY OF SUPPLY has a vacancy at R.O.F. Woolwich for a leading DRAUGHTSMAN experienced in lighting, power layouts and electrical circuits. Applicants should have had a recognised workshop training and possess the Higher National Certificate or equivalent, and have good drawing office experience in the class of work stated. Starting salary according to age, qualifications and experience within the range £570 to £675 per annum.—Applications to any Employment Exchange, quoting Order No. Woolwich 2374. (P 653)

PHYSICISTS AND ELECTRICAL ENGINEERS for work on microphones, receivers, transducers, etc., preferably with some experience.—Write, stating age, qualifications and experience, to Personnel Officer, Ericsson Telephones Ltd., Beeston, Nr. Nottingham. (P 676)

PHYSICISTS AND PHYSICAL CHEMISTS for work on properties of materials and on semi-conductors.—Write, stating age, qualifications and experience, to Personnel Officer, Ericsson Telephones Ltd., Beeston, Nr. Nottingham. (P 675)

PHYSICISTS OR ELECTRICAL ENGINEERS for research and development on cold cathode valves and similar discharge devices.—Write, stating age, qualifications and experience, to Personnel Officer, Ericsson Telephones Ltd., Beeston, Nr. Nottingham. (P 674)

PHYSICIST required for work connected with the development of rubber and plastic cables. Applicants should have Inter B.Sc. or similar qualifications. Location: Leigh Works, Lancs.—Applications, in writing, should be addressed to the Staff Officer, British Insulated Callender's Cables Ltd., Prescot, Lancs. (P 673)

PRODUCTION MANAGER required. Switch/control gear works near Walsall. Only first-class men need apply.—Box No. 1389, Electrical Times. (P 672)

REQUIRED FOR MIDDLE EAST. (*a*) First-class OVERHEAD LINESMEN experienced in the erection of steel and wood poles and lines up to 11 kV, with copper conductors, suspension insulators, straining wire, etc; (*b*) First-class PLUMBER JOINTER experienced in jointing paper insulated cables, lead covered and armoured, up to 11 kV.—Apply, stating age and experience. Forward copies of testimonials or state names to whom we may apply to Box No. 1339, Electrical Times. (P 538)

RESEARCH ENGINEER required by Cooke and Ferguson Ltd., Manchester, for interesting and responsible work. Applicants should be 23 to 30 years of age and of H.N.C. or degree standard. Experience of materials testing and processing, or thermal and di-electric phenomena, particularly relating to switchgear, will be an advantage.—Please reply, stating full information and salary required, to Personnel Manager, Cooke and Ferguson Ltd., Openshaw, Manchester 11. (P 666)

SALES REPRESENTATIVE required by South London electrical wholesalers. Must be live, thoroughly experienced, with good trade connections, London or Surrey area. Excellent prospects for right man.—Full details to Box No. 1387, Electrical Times. (P 669)

SECRETARY. Applications are invited for the post of the Secretary of the British Electrical and Allied Manufacturers' Association (Inc.). Experience in the electrical industry is not so essential as a wide experience in secretarial duties in a progressive organisation. —Applications giving full particulars including training, positions held, professional and other qualifications, age, and salary required, should be marked "Private" and addressed to "The Director, The BEAMA, 36 Kingsway, London W.C.2." (P 590)

SENIOR DESIGN DRAUGHTSMEN required. Applicants must be experienced in gear design, fabrications and electro-mechanical equipment. Good working conditions and prospects.—Apply in writing, stating age, experience, salary required, etc., marking envelopes "G.S.," to Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester 17. (P 503)

SENIOR ELECTRICAL ENGINEER required for duty in Middle East by large oil company. Honours degree and/or A.M.I.E.E. qualification with administrative experience and considerable practice in the lay-out, operation and maintenance of h.t. and l.t. systems from generation to end use. Desirable age limit 40. Generous allowances in addition to salary; pensionable post; biennial (paid) home leave.—Write quoting No. 158, to Box 5541, c/o Charles Barker and Sons, Ltd., 31 Budge Row, London E.C.4. (P 638)

SENIOR METER TESTER required for single-phase house service meter. Applicant with some knowledge of instruments an advantage but not essential.—Apply, giving details of industrial experience, stating age, whether married or single, and salary required, to Personnel Officer, Crompton Parkinson Ltd., Chelmsford, Essex. (P 663)

SENIOR SALES ENGINEER required by large South London Company. Applicants who must have had experience of telephone and ancilary equipment should possess a degree or its equivalent and have had not less than ten years' Industrial Commercial experience. Able to control tendering staff and represent the Company in its dealings with customer's senior engineers. The remuneration offered is substantial and will depend upon the capabilities and qualifications of the selected applicant.—Write giving full details to Box No. 1391, Electrical Times. (P 694)

TECHNICAL ASSISTANT. A large light electrical engineering company in the West London area, require a technical assistant for their engineering laboratory. Applicants should have a good working knowledge of domestic electrical and mechanical appliances, including radio, television and industrial electronics. Minimum qualification Higher National Certificate (Electrical). Special knowledge of electronics an advantage. Good conditions and pay.—Write, giving details of age, qualifications and experience, to Box No. 1377, Electrical Times. (P 645)

APPOINTMENTS WANTED

ELECTRICAL ENGINEER, Honours Degree, A.M.I.E.E., A.M.I.Mech.E. (35) graduate apprentice, switchgear engineer, 4 years consulting engineer, seeks new executive post.—Box No. 1347, Electrical Times. (P 554)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines). —Service Electric Co., Ltd., Stanmore, Middx. (D 324)

CASTINGS. Fisher Foundries Ltd., Great, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (P 570)

ENQUIRIES invited for repetition ARMATURE AND STATOR WINDING. Prompt delivery offered.—Magstarlite, Ltd., Beavor Works, Beavor Lane, Hammersmith, London, W.6. (P 411)

FRACTIONAL motors, Armatures and field coils wound. Output, 250 armatures per week.—Lowdon Bros. and Co. (Engineers) Ltd., Temple Electric Works, Dundee. (P 577)

TOROIDAL WINDING. Your inquiries are invited for this type of winding, to your own specification —Frank Hewitt, Ltd., Cross Street, Radcliffe, Lancs. (P 632)

WANTED

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types, Steel Balls and Rollers. Top prices Paid, small quantities accepted.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
Renown 6174 (P 546p)

A LARGE quantity of CONDUIT AND FITTINGS in all sizes required for immediate cash. Continual orders will be given.—Dublin Wholesale, 39 Westland Row, Dublin. (P 621)

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

ENAMELLED COPPER WIRE, size ·0064 in. (37½ G), in any quantities up to 500 lb.—Submit offers to Box No. 1379, Electrical Times. (P 651)

MERCURY, platinum points, wire scrap, etc., purchased for cash.—Tresha, 1 Wardrobe Place, Ludgate Hill, London, E.C.4. (Open Sats.) (P 407)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write, Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHitehall 9621/2/3. (A 3)

STEEL SHEETS, PLATES, STRIP and BARS. Any quantity, immediate payment.—Grades Sheared Metal Co., Ltd., Green Lane, Hounslow, Middx. Tel.: Feltham 3274. (P 582)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London, E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

AGENCIES

OLD ESTABLISHED FIRM of engineers' Agents with offices Westminster and an experienced technical Sales organisation in direct contact with principal Government departments, railway undertakings, important industrial concerns at home and abroad, accustomed to negotiating large contracts, is open for proposals from manufacturers of Mechanical and electrical equipment seeking London and export representation on payment by results basis.—Apply Box No. 1333, Electrical Times. (P 634)

WHOLESALE SELLING AGENTS required in all principal towns. Sole area distribution for comprehensive range l.t. switchgear.—Box No. 1351, Electrical Times. (P 572)

BUSINESS OPPORTUNITIES

ADVERTISER desires to dispose of his majority holding in a company formed for the manufacture of a patented electrical apparatus, which has potential sales to domestic and industrial users, with excellent export prospects. Tooling in an advanced stage.—Write Box No. 1367, Electrical Times. (P 636)

FOR SALE

ENGINEERING PLANT & MATERIALS

80,000

NEW BALL RACES, ROLLER, THRUST AND TIMKEN RACES in stock. Advise requirements.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
Renown 6174 (P 547p)

BRASS SHEETS to BSS 265, half hard, 4ft. x 2 ft., app. 10 tons, each of 16, 18 and 20 gauges. Prompt delivery. Inquiries to Box No. 1365, Electrical Times. (P 635)

30,000 Brand New R & M.K.L.M. J.10, BALL RACES, 10 x 32 x 9.—89/921 Fulham Road, London, S.W.6. (P 559)

CABLES & WIRE

ARMOURED CABLE, 222 yd approximately, .3 sq in., 4-core 660 V paper-insulated lead-covered steel wire, armoured and served to BSS 480, 1942. Aberdare manufacture surplus to contract. New cable.—Box No. 1373, Electrical Times. (P 611)

D.C.C. COPPER WIRE available ex-stock: 2¼ tons 26G.; ½ ton 23G. Also EN. & S.A.S. COPPER WIRE: ½ ton 42G. and P.V.C. 44,000 yd. 1/044.—The Mulberry Co., 223 St. John St., London, E.C.1. Tel.: Clerkenwell 8356-7-8. (P 584)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW, no purchase tax. All lengths 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed. Prompt delivery. Write for latest lists and trade terms to Distributors—John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

GENERATING PLANT

STEAM DRIVEN GENERATING SETS. 2,500 kW (312 kVA) pass out TURBO-ALTERNATOR SET by Howden-Siemens, for 480/3/50, speed 3,000 r.p.m. Steam pressure 915 lb sq in., temperature 510° F., passing out 50,000 lb Steam per hr at 40 lb pressure. Mirrlees surface condenser and condenser pump.

1,250 kW TURBO-ALTERNATOR SET by Hick Hargreaves/Mather and Platt, for 440/3/50, 4 wire, 0·8 P.F. steam pressure 160 lb with superheat up to 150° F. Five-stage turbine with 7 runners, direct coupled to David Brown reduction gear, ratio 5,600-1,509 r.p.m.

665 kVA (500 kW) steam-driven ALTERNATOR SET by Belliss and Morcom-Siemens, for 5,000/3/50, 77 amps. Steam pressure 150/155 lb. Speed 333 r.p.m.

George Cohen, Sons, and Co., Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070 and Stanningley, nr. Leeds. Tel.: Pudsey 2241. (P 597)

TWO-CYLINDER 70-h.p. vertical Robey SEMI-DIESEL ENGINE. Direct coupled electrical generator and switchboard. 230 V, generate 150-160 amp.—Hornton Quarries Ltd., North Bar, Banbury, Oxon. (P 578)

9-KVA PETROL ENGINE Generating Set. 220 V, a.c., 16-h.p., 4-cylinder Meadows Engine. Complete with control panel. Battery charging unit. Complete with switch and control panels.—O.T.M. Machinery, Ltd., Station Road, Egham. Tel. 220 (P 626)

600 kVA (480 kW) revolving field ALTERNATOR by E.C.C., for 400/3/50, 600 r.p.m. with direct coupled exciter generator and single pedestal R.O.B. Mounted on C.I. bedplate and complete with control gear. Can be converted to 3 bearing machine with shaft extension for belt drive.—Box No. 1361, Electrical Times. (P 612)

MOTORS & STARTERS

A. ELECTRICAL CO. FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC
Any voltage, new, short delivery, all types of revolving electrical power.
ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9.
Telephone: COLindale 4621/2. (D 17p)

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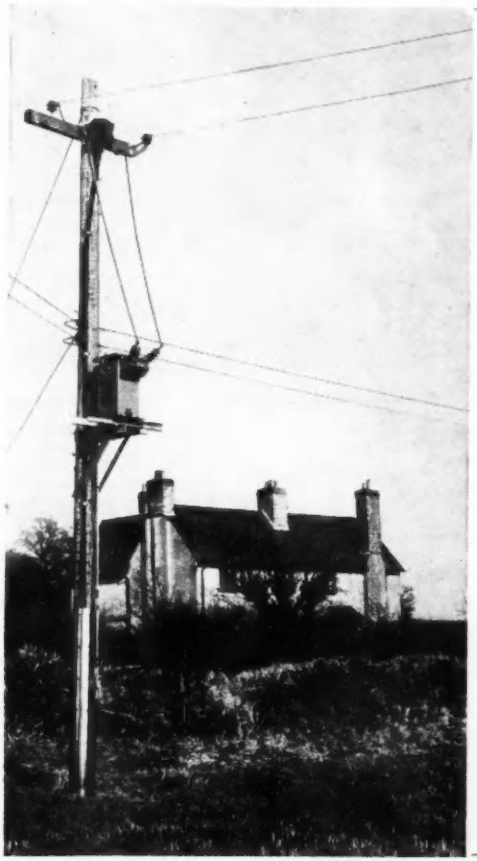

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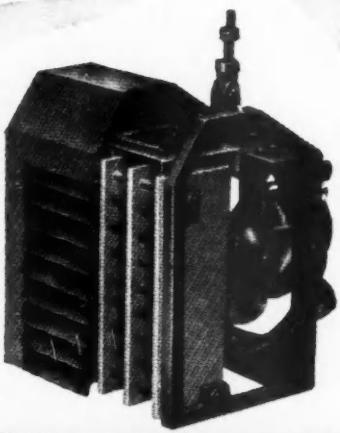

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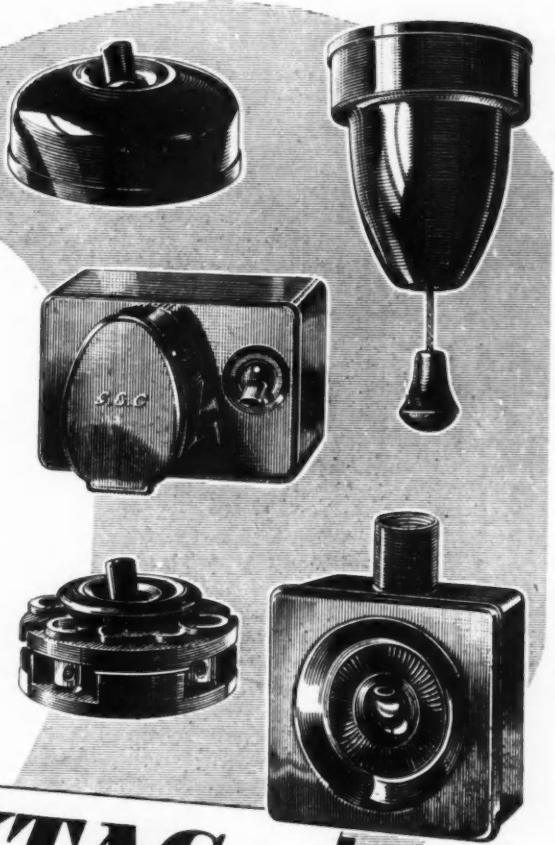

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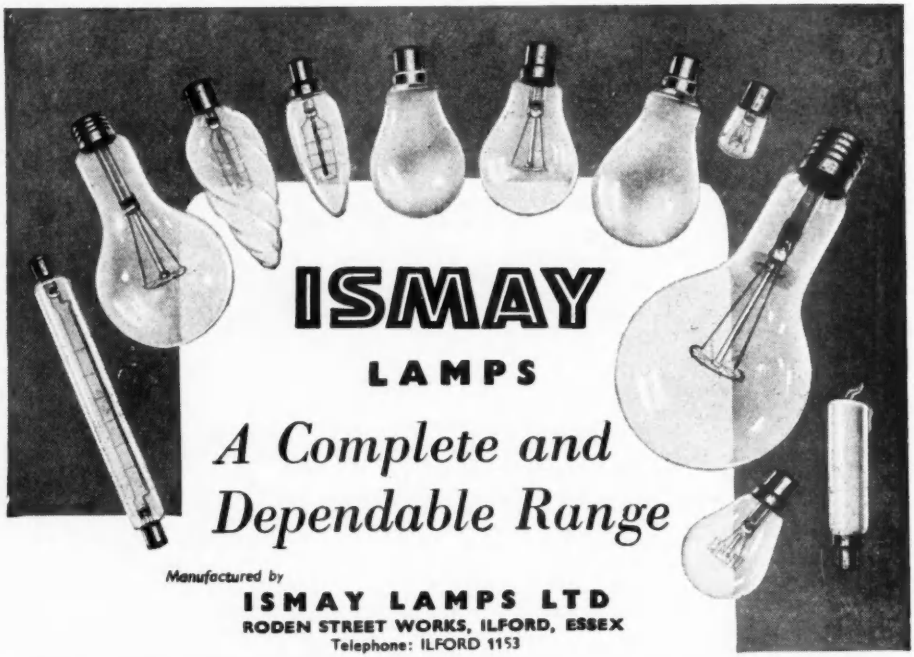

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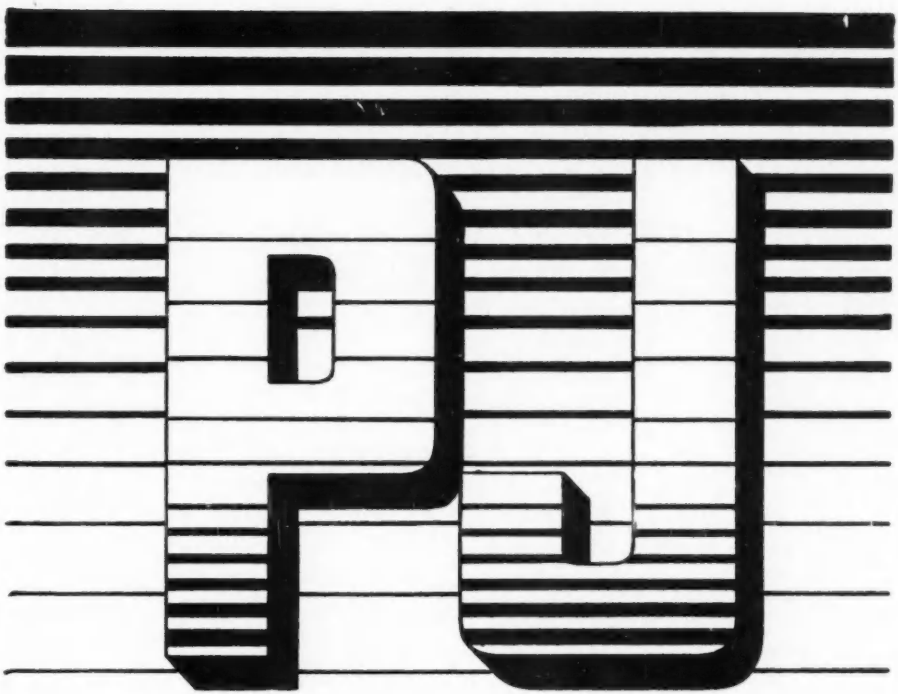

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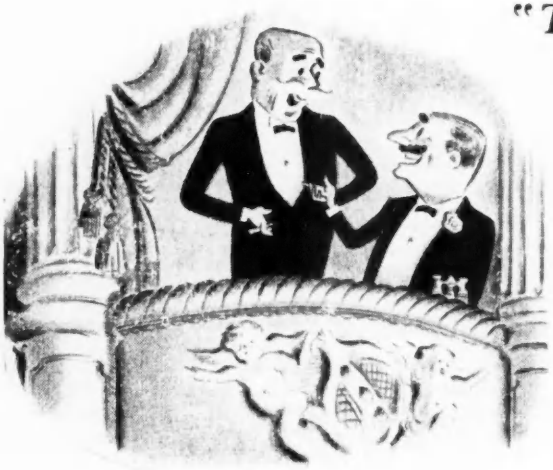

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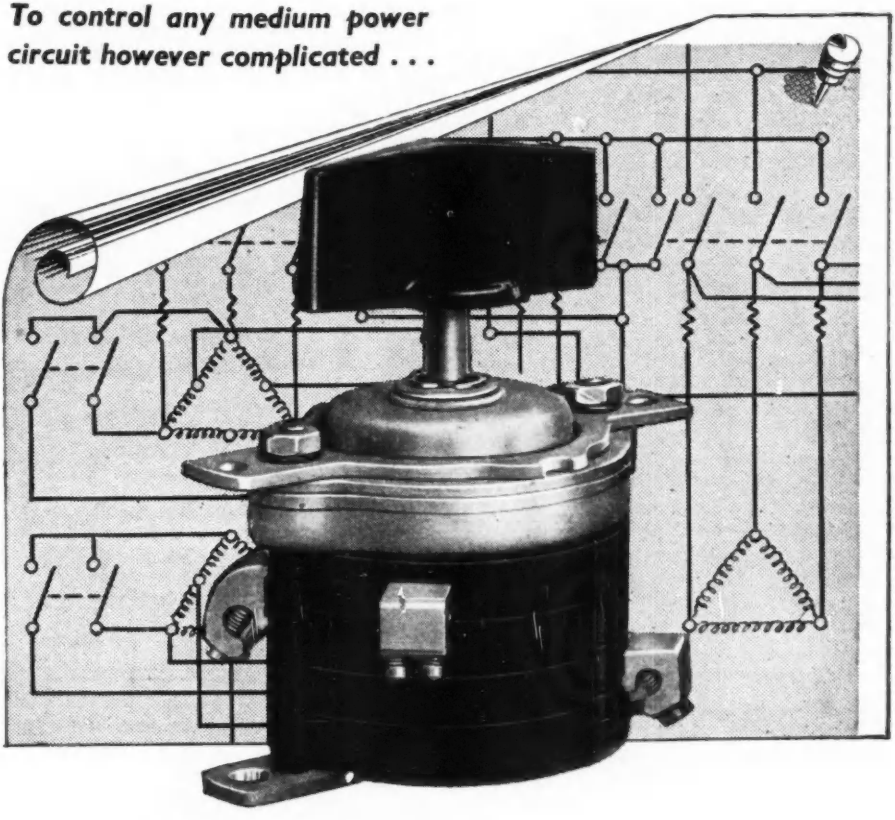

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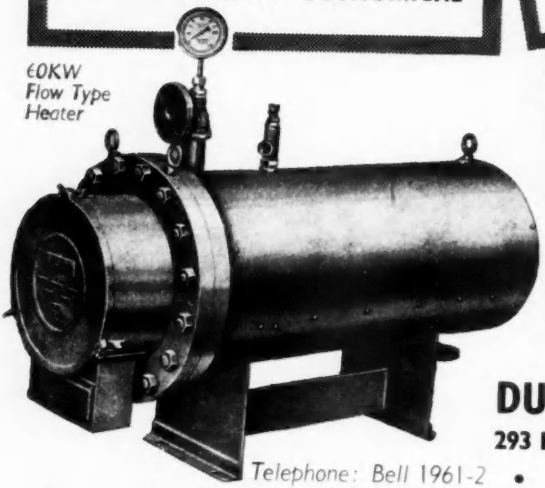

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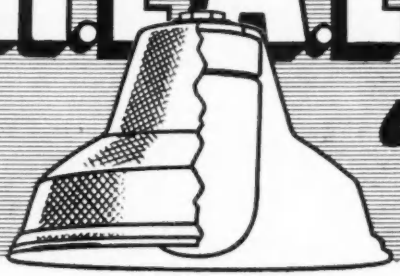
R.E.A.L tough... is tough INDEED!



This R.E.A.L. Heavy Duty fitting is typically tough! Watertight and non-corrodible, the R.E.A.L. Patent one-piece porcelain body, and the screw-neck glass globe, are protected by the 'overall' formation of the reflector, while the entire weight of the unit is carried by the Aluminium Die-cast top-member.

Remarkably clean in line, there is yet a solidity about this fitting that promises the durability it provides.

Standard Reflectors are of Vitreous Enamel Steel, but reflectors of specially treated aluminium are available where highly corrosive action has to be countered.

60, 100 and 200 watt fittings. Also with Angle-Concentrating Reflectors. Choice of Clear Glass or Crystalux Screw-neck Globes. SEND FOR LEAFLET P.9512.

Years ahead on Durability!

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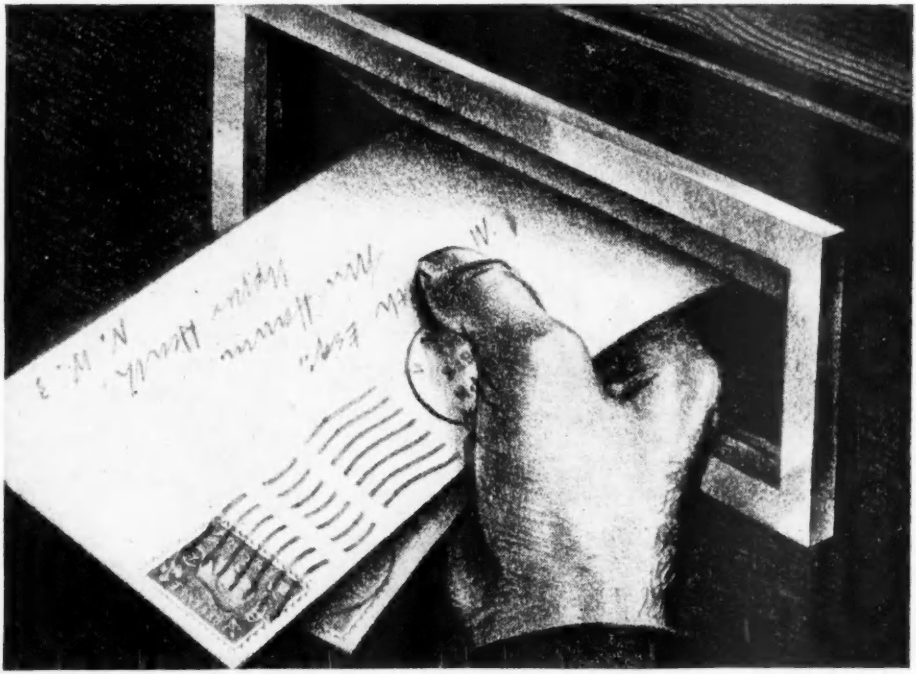

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The postman's double-knock and the plop of the letter on the front door mat are the end results of a long train of events. Sorters, mail vans and mail trains running to split-second schedule, robot operated underground railways, together with all the experimental work post office engineers undertake in a search for greater efficiency . . . all these are part of your early morning delivery . . . and all you take for granted. Wakefield Industrial Lubricants are the end results of a long train of events. Perpetual research into every aspect of lubrication, unceasing vigilance at every stage of manufacture, 50 years' experience in producing the world's finest oils . . . all these are taken for granted by the engineer who knows from experience that the never-failing efficiency of Wakefield Oils, combined with the full use of their Industrial Lubrication Service, is one of the surest ways to greater efficiency and lower operating costs.

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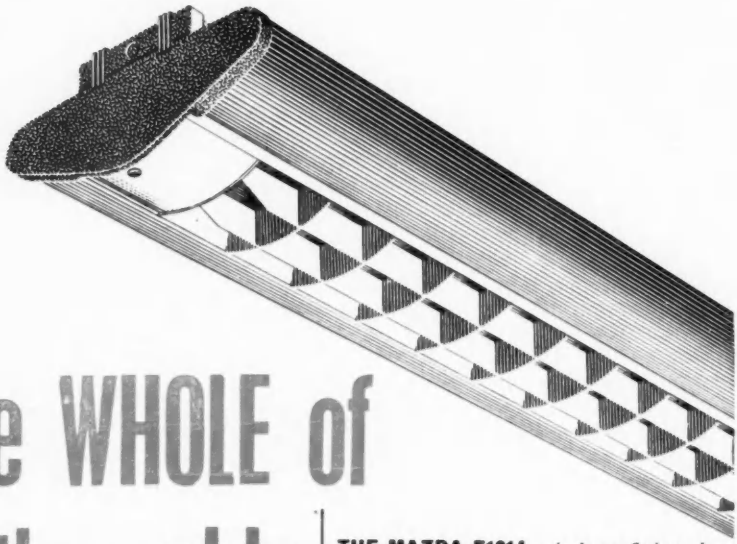

The WHOLE of both worlds

Good looks and good engineering in this stylish Mazda fitting

THE MAZDA F1214 is now firmly established as a favourite. Architects, consultants and estate departments are continually specifying it in its twin or single lamp version because it is a classic example of the way in which sound engineering can be happily married to an attractive appearance. It looks essentially *right* in shops and showrooms, hotels, banks, public buildings, offices and, indeed, in any setting where style is important.

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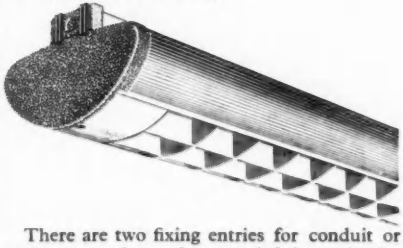
M4359

THE MAZDA F1214 twin-lamp fitting *above* and single lamp fitting *below* are designed to give a good working (downward) light, but enough light sideways and upwards for the brightness of the fitting to blend in with light-coloured ceilings and surroundings.



There are two fixing entries for conduit or chain suspension and a central fixing point for BESA box entry. End-to-end mounting is greatly simplified by interlocking end-castings incorporating a knock-out which provides a through wire-way.

Auxiliary gear is assembled in back channel and ready-wired to a connector block.

Construction is of sheet steel with reeded 'Perspex' side-screens. Metal louvers are instantly detachable for lamp maintenance. Starter-switches can be replaced without removing any part of the fitting.

Finish is in stone-coloured enamel with white reflecting surfaces. For use with either one or two Mazda 80 Watt 5 ft. fluorescent lamps.

Write for Descriptive List No. 9630-1 which gives full particulars.

B T-H